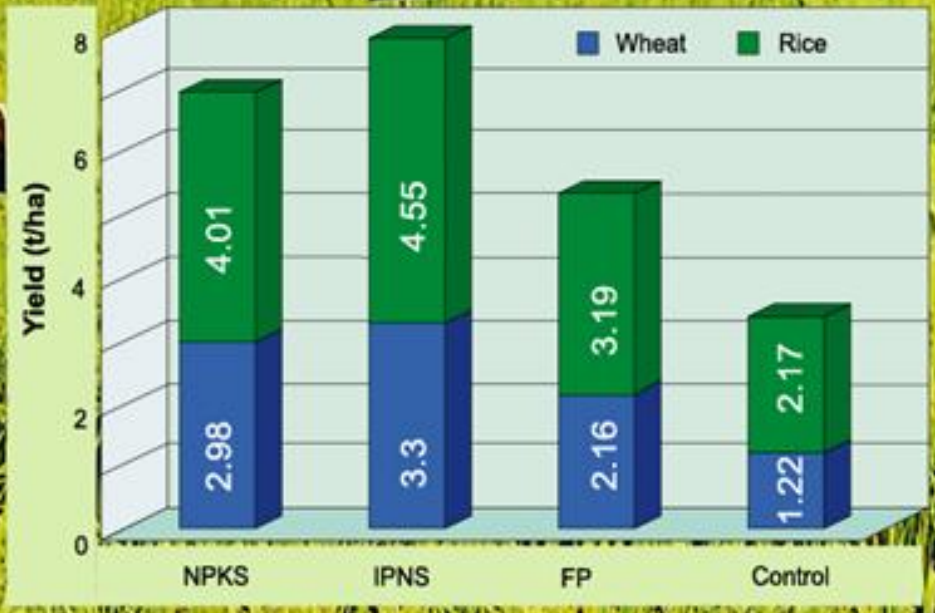
FERTILIZER RECOMMENDATION GUIDE-2005



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FERTILIZER RECOMMENDATION GUIDE -2005

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FERTILIZER RECOMMENDATION GUIDE-2005

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FERTILIZER RECOMMENDATION GUIDE-2005

Published by
The Bangladesh Agricultural Research Council
Farmgate, New Airport Road, Dhaka-1215.

BARC
Soils Publication No. 45
2005

ISBN : 984-32-3166-X

8,000 Copies

Cover Design :
A.K.M. Rashidul Haq
Deputy Director, SFFP, DAE

Printed at :

Peoples Press & Publications
33/1, Purana Paltan
Dhaka-1000
Phone : 9559414

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FOREWORD

The first Fertilizer Recommendation Guide (FRG) was published by the Bangladesh Agricultural Research Council (BARC) in 1979, which was based largely on soil series information and results of fertilizer field trials. Soils & Fertilizer management is very complex & dynamic in nature. With the advancement of technology and with the progress of soil fertility & fertilizer management research in the country, there has been a continuous need for updating the guide. Accordingly, the First Fertilizer Recommendation Guide was updated by BARC during 1985 using fundamental principles of fertilizer recommendation on the basis of soil test & crop response. After 1985 a computerized database on land type, soil, hydrology & agroclimatic parameters has been development and subsequently information on soil fertility & land type-wise major crops & cropping pattern along with crop management practices in different agro-ecological zones were compiled. Subsequently, with the advancement of time and research progress, the Fertilizer Recommendation Guide was updated in 1989 and then again in 1997. During 1997-2005 considerable progress has been made on soil fertility & fertilizer management research and extension by the NARS institutes and the extension department.

The present Fertilizer Recommendation Guide-2005 is the updated version of the FRG-1997. The FRG-2005 includes information on more crops & cropping patterns, updated soil nutrient status of different agro-ecological zones, nutrient balance status, soil & fertilizer management based on IPNS concept, fertilizer management in multiple cropping system, minimum tillage, hill farming and additional information on the quality control aspects of fertilizer.

The Fertilizer Recommendation Guide 2005 is the output of the concerted effort made by eleven-member editorial committee. The committee was responsible to follow up the recommendations of the workshop on "Updating of Fertilizer Recommendation Guide 1997", held on 23 March 2005 at BARC. The final draft of the guide was approved by the National Agricultural Technical Coordination Committee (NATCC) in the meting, held on 9 October 2005 at BARC.

The Fertilizer Recommendation Guide-2005 has been prepared primarily for the extension personnel in developing location specific fertilizer recommendation for different crops & croping patterns. This guide deals more with the principles rather than blanket recommendation. I strongly believe that the user will find it useful for a balanced and optimum utilization of this costly input for increasing production of crops.

My sincere thanks to the Danish International Development Assistance (DANIDA) for providing the fund for printing of this guide through the "Integrated Soil Fertility and Fertilizer Management Project (SFFP-II)". The remarkable & untiring assistance rendered by the scientists from different institutes of the National Agricultural Reserch System (NARS) and by the officials of the Department of Agriculture Extension (DAE) is thankfully acknowledged.

November 30, 2005

Dr. M. Nurul Alam
Executive Chairman
BARC

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FOREWORD

Food production in Bangladesh has increased keeping pace with increase of the population. This could be achieved because of development of high yielding varieties, increased area under irrigation and the use of inorganic fertilizers. High yielding varieties however, take up more nutrients compared to the local varieties. If balanced fertilizers are not applied during crop cultivation, there will be depletion of soil nutrients leading to production decline as well as to deterioration of soil physical and chemical properties. In order to sustain agricultural production, it is important to maintain these soil physical and chemical properties by using organic and inorganic fertilizers in the best possible way.

To meet the increasing demand of the growing population, further production increase through intensification of agriculture is necessary. This is even more so, because a growing part of the agricultural land is converted for non-agricultural purposes. It is estimated that settlements, infrastructures, industries and water bodies now occupy more than 30 % of the land, while 15 years ago this proportion was 15 %. In line with the government's policy to ensure food self sufficiency for the growing population and to promote crop diversification, there is a need to further develop high yielding varieties. This will require more plant nutrients to obtain and sustain high levels of agricultural output. To be able to maintain nutrient balance first of all it is necessary to understand the cropping systems, land types, soil nutrient status and nutrient demand of individual crops. Bangladesh Agricultural Research Council published the first fertilizer recommendation guide in 1979, which was found to be very useful for the extension agents and farmers. With the elapse of time, there have been considerable changes in crops and cropping patterns including soil physical and chemical characteristics. Many areas became deficient in zinc, boron and other nutrients. Considering all these factors, BARC has periodically updated and published the fertilizer recommendation guides during 1985, 1989 and 1997 to accommodate more crops and cropping patterns with new information and findings. In continuation of this process, it was necessary to update the "Fertilizer Recommendation Guide, 1997" with further research information and feedback from the extension officers and farmers. BARC in collaboration with relevant stakeholders has done a mammoth task to develop the new "Fertilizer Recommendation Guide, 2005" which I believe will be very useful again for the extension workers and the farmers.

I thank BARC and other organizations who have contributed in developing the "Fertilizer Recommendation Guide, 2005"; in particular the Embassy of Denmark through the Integrated Soil Fertility and Fertilizer Management Project (SFFP - II) for providing financial assistance to publish this "Fertilizer Recommendation Guide, 2005"

Md. Ibrahim Khalil
Director General
Department of Agricultural Extension

November 30, 2005

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FERTILIZER RECOMMENDATION GUIDE – 2005

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FERTILIZER RECOMMENDATION GUIDE – 2005

1. INTRODUCTION

1.1 Development of Fertilizer Recommendation Guide in Bangladesh

Research on soil fertility and fertilizer use at farm level was started in the then East Pakistan during 1960's with establishment of the Soil Fertility and Soil Testing Institute. The Bangladesh Agricultural Research Council (BARC) had published the First Fertilizer Recommendation Guide (FRG) in 1979. Findings of the soil fertility trials under field conditions were incorporated in that guide.

Later on, data generated by different organizations in the areas of soil analysis, plant nutrition, crop response to fertilizer application and soil survey were taken into account while publishing the Second Fertilizer Recommendation Guide in 1985. This Guide had provided fundamental principles for fertilizer recommendation on the basis of soil test and crop response.

After 1985, a good progress in the soil fertility and fertilizer management research has been made in this country. During the period, a computerized data base on land type, soil & hydrology and agro climatic parameters has been developed and subsequently used in preparing the AEZ map of Bangladesh. Information on soil fertility and land type-wise major cropping patterns along with crop management practices in different agro-ecological zones are compiled. Fertilizer Recommendation Guide of 1985 was updated and published in 1989. The FRG-1989 had two parts: Part 1 dealt with the principles for making location specific fertilizer recommendation of crops and Part 2 dealt with cropping pattern based fertilizer recommendation for moderate yield goals for AEZs.

With the advancement of time and research progress, the FRG-1989 was updated in 1997. Main features of the FRG-1997 were: (i) interpretation of the soil test values based on critical limits for different nutrients was updated and classified into six categories, and (ii) recommended fertilizer doses for phosphorus and potassium were shown as P instead of P_2O_5 and K instead of K_2O for uniformity and simplicity.

The present **Fertilizer Recommendation Guide-2005** is a revised and updated version of the FRG-1997. Some important issues have been taken into care and critically reviewed. Major features of this guide (FRG-2005) are:

- Updated recommendation of fertilizers for different crops based on varieties and yield target
- Changing crops and cropping patterns
- Updated soil nutrient status of different AEZs
- Updated critical limit of nutrients
- Nutrient balance
- Liming of acid soils
- Socio-economic impacts on balanced fertilization
- Increasing nutrient use efficiency with an emphasis on deep placement of nitrogen
- Soil and fertilizer management based on IPNS concept
- Fertilizer management in multiple cropping systems
- Fertilizer management in crops under no/minimum tillage system
- Fertilizer management in problem soils (saline, peat, acid sulphate and charlands)
- Fertilizer management in hill farming
- Fertilizer management in risk environment
- Quality control of fertilizers

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- Maintenance of organic matter in soils

1.2 Use of Fertilizer Recommendation Guide

This Fertilizer Recommendation Guide-2005 has been prepared primarily for the extension personnel in developing location specific fertilizer recommendations for different crops and cropping patterns. Two approaches have been used: (a) The one is the development of location specific fertilizer recommendation for crops based on soil test values and target yields, and (b) The other is the fertilizer recommendation for moderate yield goals and land category based cropping patterns for different agro-ecological zones (AEZs).

This guide deals more with the principles rather than blanket recommendations. Therefore, one should have clear concept about objectives of the guide. The following steps are suggested for the users:

1. Read the guide thoroughly to understand rationale and principles of fertilizer application.
2. Use general fertilizer recommendations for cropping patterns (page 146-220) for those areas for which site specific soil test values and their interpretations are not available.
3. Develop location specific fertilizer recommendations for crops (upland and wetland) where soil test values are available. Interpret the soil test values into soil fertility classes, such as very low, low, medium, optimum, high and very high based on Appendix-8 and Fig. 8
4. Prepare fertilizer recommendation for a target yield of a specific crop based on the tables given on pages 60-143 and Appendix-9. Develop fertilizer recommendations for the cropping patterns based on the rationales given on pages 40-41
5. Calculate the amount of fertilizers by following Appendix-2.

2. PLANT NUTRIENTS

2.1 Essential nutrient elements

Plants contain more than 90 elements, but only 16 elements are recognized as essential. These elements are carbon, hydrogen, oxygen, nitrogen, phosphorus, potassium, calcium, magnesium, sulphur, iron, manganese, zinc, copper, molybdenum, boron and chlorine. Besides these, another four elements viz. silicon, sodium, cobalt and vanadium might be beneficial for a group of plants. Except carbon, hydrogen and oxygen, all the 13 elements are taken up by plants from soils and they are called mineral nutrients. Plants obtain carbon, hydrogen and oxygen from air and water. The nutrients can be divided into two groups on the basis of the quantity required by the plants: macronutrients and micronutrients. Macronutrients are required relatively in larger quantities (usually above 0.1 % on dry weight basis) while micronutrients are required in smaller quantities (usually below 100 ppm). Carbon, H and O constitute 90-95% of plant dry matter weight. Nitrogen, P and K are called primary nutrients because of their large requirement and Ca, Mg & S are called secondary nutrients.

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Table 1. Plant nutrients and their sources

Macronutrients		Micronutrients
Mostly from air and water	From soil	From soil
Carbon (C) Hydrogen (H) Oxygen (O)	Nitrogen (N) Sulphur (S) Phosphorus (P) Calcium (Ca) Potassium (K) Magnesium (Mg)	Iron (Fe) Manganese (Mn) Copper (Cu) Zinc (Zn) Boron (B) Molybdenum (Mo) Chlorine (Cl)

2.2 Nature and supply of plant nutrients

Plants build up their biomass using water from soil, CO_2 from air, energy from sunlight and nutrients from soil. For optimum plant growth, nutrients must be available:

- as solutes in the soil water,
- in adequate and balanced amounts, corresponding to the instant demand of the crop, and
- in a form which is accessible to the root system (except when provided through foliage).

Plants obtain nutrients mainly from:

- soil reserves,
- mineral fertilizers,
- organic sources,
- atmospheric nitrogen through biological fixation,
- atmospheric deposition, and
- irrigation, flood and sedimentation.

2.3 Functions of nutrients in plant

Plants, like animals, require food for their growth and development. This food is composed of certain elements referred to as plant nutrients. Plant nutrients are of completely inorganic in nature. But man and animals also require organic foodstuffs in addition to inorganic nutrients.

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Major functions of different nutrients in plants:

Nutrient	Functions
Nitrogen (N)	Constituent of proteins, nucleic acids and chlorophyll
Phosphorus (P)	Constituent of nucleic acids and phospholipids; involvement in energy transfer
Potassium (K)	Enzyme activation; osmotic and ionic regulation
Sulphur (S)	Constituent of amino acids, biotin, Vit. B, and coenzyme A
Calcium (Ca)	Constituent of cell wall; role in cell division and permeability of cell membrane
Magnesium (Mg)	Constituent of chlorophyll; cofactor for enzymatic reactions
Iron (Fe)	Component of cytochromes, ferrodoxins and leghaemoglobin
Manganese (Mn)	Involvement in oxidation-reduction reactions; formation of O_2 in photosynthesis
Copper (Cu)	Acts as an electron carrier; constituent of some enzymes e.g. cytochrome oxidase
Zinc (Zn)	Auxin formation; activation of dehydrogenase enzymes; stabilization of ribosomal fractions
Boron (B)	Regulates carbohydrate metabolism; involved in protein synthesis; role in seed formation
Molybdenum (Mo)	Constituent of nitrate reductase and nitrogenase enzymes
Chlorine (Cl)	Formation of O_2 in photosynthesis; role in osmoregulation

2.4 Deficiency symptoms of nutrients in plants

When a plant is deficient of a particular element, some characteristic symptoms appear. For example, when nitrogen is deficient, chlorophyll production is reduced and thus, the yellow pigments viz. carotene and xanthophyll appear. Deficiency symptoms may vary from plant to plant species. Generally, deficiency symptoms are similar within a plant family since they have similar nutrient requirement.

Nutrient deficiencies are relative and a deficiency of one element implies adequate or excessive quantities of another. Thus, plants exhibit external symptoms of starvation as a result of nutrient deficiency or imbalance. For example, Mn deficiency may be induced for adding large quantities of Fe. Hence, the same supply of P may become sufficient or deficient depending on the level of N supply.

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It is often difficult to distinguish among the deficiency symptoms. The yellowing of leaves may appear due to a number of nutrient deficiencies. However, variation is noticed in leaf pattern or location on the plant. Further, disease or insect damage may resemble certain minor element deficiencies.

Deficiency symptoms of various nutrients in plants :

Nutrient	**Deficiency symptoms**
Nitrogen (N)	Yellowing of older leaves; yellowing of whole leaves in case of severe deficiency, reduced tillering, stunted crop growth
Phosphorus (P)	Purple orange colour of older leaves while dark green of new leaves; reduced tillering
Potassium (K)	Older leaves may show spots or marginal burn starting from tips; increased susceptibility to diseases, drought, and cold injury
Sulphur (S)	Chlorosis of younger leaves; chlorosis of whole plant in severe cases
Calcium (Ca)	New leaves become white; growing points die and curl
Magnesium (Mg)	Marginal or interveinal chlorosis with pinkish colour of older leaves; sometimes leaf-rolling like drought effect; plants susceptible to winter injury
Iron (Fe)	Interveinal chlorosis of younger leaves; whole leaf may become first yellow and finally white in case of severity
Manganese (Mn)	Similar to iron deficiency; necrosis develops at advanced stage instead of white colour
Copper (Cu)	Chlorosis of young leaves, rolling and dieback
Zinc (Zn)	Rusting of leaves in rice, uneven crop growth, delay in maturity
Boron (B)	Pale green tips of blades, bronze tint; death of growing points, unfilling of grains
Molybdenum (Mo)	Mottled pale appearance in young leaves; bleaching and withering of leaves
Chlorine (Cl)	Wilting of leaflet tips; chlorosis of leaves leading to bronzing and dying

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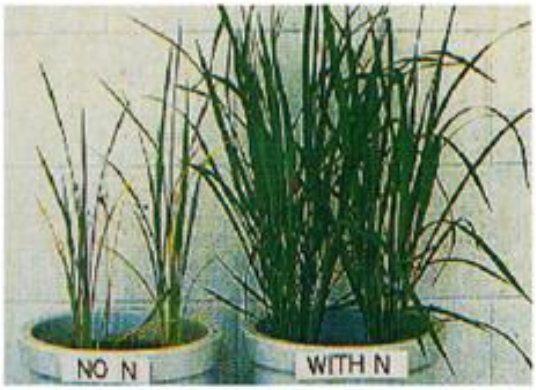

N deficiency in early stage of rice showing yellow to yellowish-green leaves, stunted and spindly growth, and reduced tillering.

N deficiency in maize leaf showing V-shaped yellowing on the tips of leaves.

P deficient maize plants with reddish purple leaf tips and margins.

K deficiency in rice. Senescence and high rate of mortality of order leaves. Brown spot in young leaves.

Symptoms of K deficiency in leaves and fruits of tomato. Yellowing in magins and tips of lower leaves. Top leaves become yellowish and then brownish. Deformed fruit are formed. Upper fruits ore deformed and lower fruits are normal.

S deficiency symptoms in rice. Younger leaves turning uniformly light green to yellowish colour. Plants are retarded in growth and have slender and shorter stalks.

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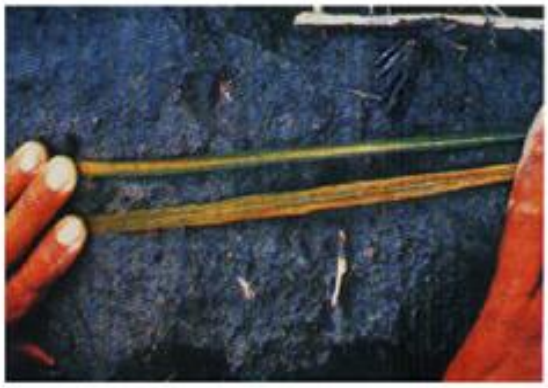
Mg deficiency in maize showing interveniel chlorosis in leaf



Zn deficient rice leaf showing brown spots around mid rib

Zn deficient rice field. Missing hills, stunted growth, brown and dry appearance.

Boron dificiency in wheat. Spikelet sterility due B-deficiency (left).

Mo deficiency in cauliflower with no head

Mo deficiency in cabbage showing pale appearance in leaves.

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2.5 Availability of nutrients in soils

Nutrients can exist in the soil in various forms, viz. dissolved in the soil solution, adsorbed on the soil particle surface or as constituents of the solid phase (sparingly soluble minerals, organic matter, and occluded material). These sources are not independent; inter-conversions between them are possible. The availability of a nutrient refers to that fraction of the nutrient which is accessible to plant roots. It is often observed that the total status of a particular nutrient in soil is high but the plants grown on this soil suffers from deficiency of that element. This indicates, the extent of availability is a big concern in question of plant uptake and consequent growth. Thus, a portion of the total content becomes available for plant uptake depending on some soil conditions, viz. soil pH, soil texture, organic matter content, flooding, nutrient interaction, temperature, etc.

Soil conditions inducing nutrient deficiency of crops :

Nutrient	**Major conditions inducing deficiency**
Nitrogen (N)	Low organic matter, submerged soils, burning of crop residues
Phosphorus (P)	Acidic, organic, leached and calcareous soils
Potassium (K)	Sandy, organic, leached and eroded soils
Sulphur (S)	Low organic matter , submerged soils, burning of crop residues
Calcium (Ca)	Acidic, alkali and sodic soils
Magnesium (Mg)	Acidic, alkali and sodic soils
Iron (Fe)	Calcareous soils, high soil P, Mn, Cu or Zn, high HCO_3
Manganese (Mn)	Sandy soils, calcareous soils, high organic matter, high soil Fe, Cu or Zn
Copper (Cu)	High soil N, P, or Zn
Zinc (Zn)	Calcareous soils, saline soils, submerged soils, low organic matter, high soil P, Ca, Mg, or Cu
Boron (B)	Sandy soils, high pH soils, dry soils
Molybdenum (Mo)	Calcareous soils, acid soils with high free Fe content

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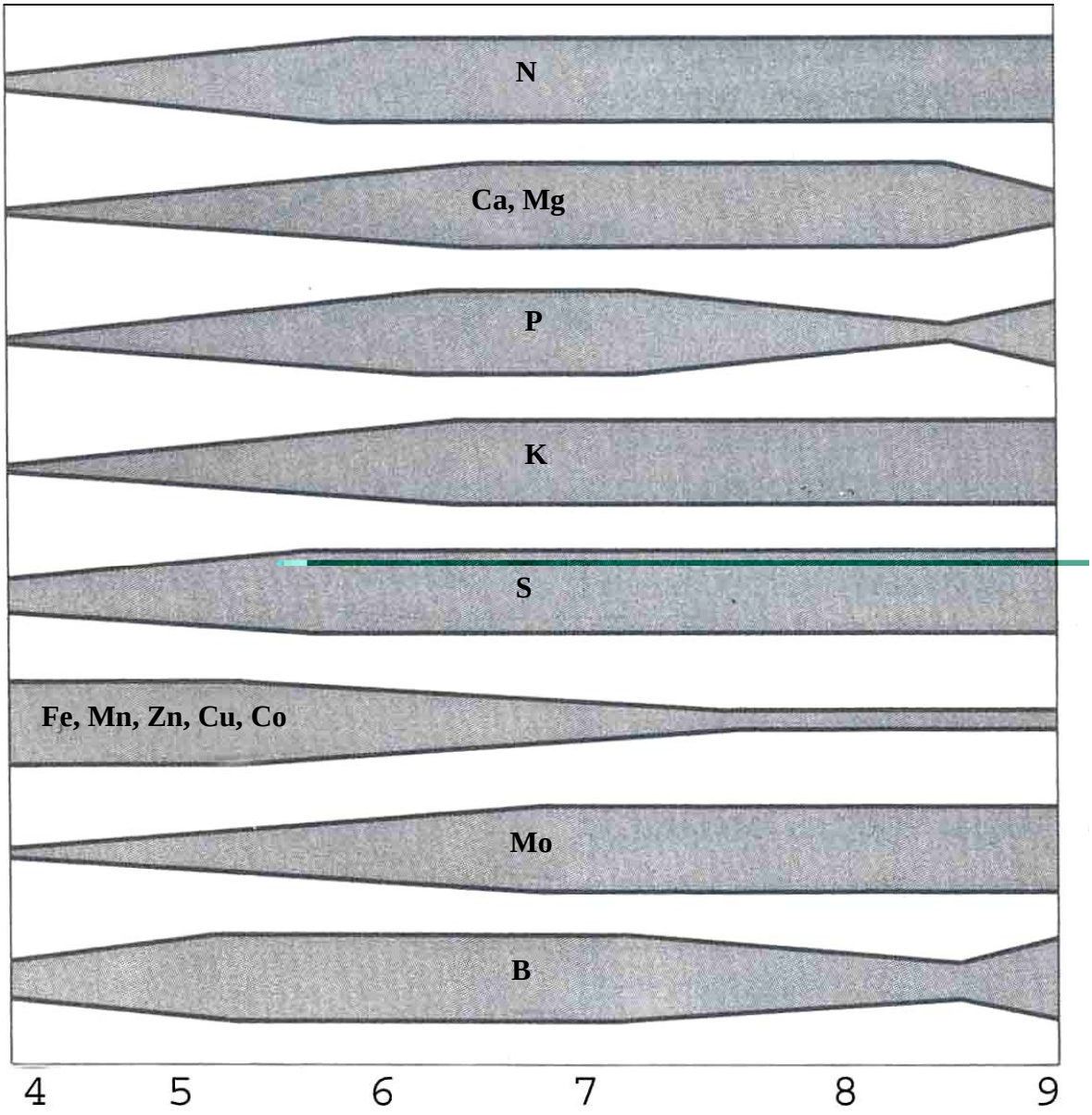

Fig.1 Effect of pH on nutrient availability in soils

Soil pH is the most important factor of nutrient availability in soils. Generally, availability of macronutrients and Mo increases as soil pH increases and reverse is true for micronutrients except Mo. Again, P availability is low in acid as well as calcareous soils. The effect of soil pH on nutrient availability is clearly illustrated in Fig. 1. In most cases, pH 6-7 is optimum for adequate availability of nutrients in soils. Classification of soils according to pH values is given in Appendix 14.

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Nitrogen: Nitrogen is the most limiting nutrient in crop production all over the world. Nitrogen deficiency occurs everywhere in Bangladesh. Understanding the behaviour of N in soil is essential for maximizing crop productivity and profitability on one hand and for reducing the possible negative impact of N fertilization on the environment on the other hand. The loss of N from the soil is mainly due to crop removal and leaching, but under certain conditions gaseous N losses through denitrification and volatilization are quite high. The utilization of fertilizer N applied to wetland rice seldom exceeds 30-40%. Higher N use efficiency is, however, possible through appropriate N management techniques. Application of total N fertilizer in several splits matching the demand of the crop for N at critical stages of growth, deep placement of N in the reduced zone of soil or thorough incorporation in the soil, use of coated/modified fertilizers are some of the useful techniques which improve N-use efficiency in rice. Application of N fertilizer in three splits for rice and 2-3 splits for other irrigated upland crops is recommended for better efficiency. For wetland rice, the loss of N in gaseous forms may be reduced by applying urea in saturated soil rather than in standing water. The basal fertilizer is best applied by broadcasting at final puddling followed by harrowing and leveling, so that the N gets incorporated in the soil. Top dressing of fertilizer N should also be done, wherever possible, in saturated fields followed by incorporation along with weeding. As N fertilizer is the main promoter of crop growth and yield, it is important to improve management practices that minimize N losses and increase the recovery of applied N by the crop. This will increase productive efficiency and reduce negative impact of N use on the environment.

Phosphorus: Phosphorus does not occur as abundantly in soils as N and K. Although the total concentration of P in the soil varies between 0.02 and 0.10%, it has no relationship with the availability of P to plants. The average concentration of P in soil solution is about 0.05 ppm which varies widely among soils while the level of organically bound P varies between a few ppm and 1000 ppm. The interrelationships among the various P fractions are complex. However, understanding the dynamics of P transformations in soils will provide the basis for sound management of soil and fertilizer P to ensure adequate P availability to plants.

Inorganic P in soil solution increases with the addition of P fertilizer. If this fraction of P is not absorbed by plant roots or immobilized by microorganisms this can be adsorbed on mineral surfaces as labile P or precipitated as secondary P compounds. The surface adsorption and precipitation reactions are collectively termed as P fixation/retention. Soil pH is the most important among the factors responsible for P fixation reactions. In acid soils, inorganic P precipitates as Fe/Al-P and/or is adsorbed on surfaces of Fe/Al oxides and clay minerals. In neutral to calcareous soils, inorganic P precipitates as Ca-P secondary minerals and/or is adsorbed on surfaces of clay minerals and $CaCO_3$. Besides pH, some other soil properties e.g. organic mater content influence P solubility and adsorption reactions, which affect P availability to plants and recovery of fertilizer P by crops.

The recovery of fertilizer P by rice is usually 8-20% and a considerable residue remains in the soil. Since the availability of P increases under wetland rice culture, P applied to upland crops, such as wheat, chickpea etc. can have greater residual effect for the succeeding rice crop. In other words, fertilizer P may be applied to one crop, preferably in the rabi season while allowing the kharif crop in the system to benefit from the residual P, particularly when the soils have low fixation capacity.

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Potassium: Soil K exists in four forms, each differing in its availability to crops. Mineral K varies from 5000 to 25000 ppm, exchangeable K from 40 to 600 ppm, and solution K from 1 to 10 ppm. Potassium is held tightly in feldspars and micas, which are very resistant to weathering. Fixed or non-exchangeable K is present within clay minerals, such as illite, vermiculite and chlorite. Exchangeable K is held on negatively charged soil colloids by electrostatic attraction. There is a continuous but slow transfer of K from the primary minerals to the exchangeable and slowly available forms. Under some soil conditions, including application of large amounts of fertilizer K, some reversion to the slowly available form may occur. The unavailable form accounts for 90 to 98% of the total soil K, the slowly available form, 1 to 10%, and the readily available form, 0.1 to 2%.

Potassium fixation does not occur to the same extent in all soils. It is high in 2:1 clays with large amounts of illite. The 1:1 type minerals, such as, kaolinite does not fix K. Usually fine textured soils have a high K fixation capacity.

Potassium requirement of tuber crops, fruits, vegetables, sugarcane, rice etc. is high and responses of these crops to K fertilizer, particularly in coarse textured, piedmont and terrace soils are well established. Tuber crops such as potato should receive K fertilizer on priority basis and the crops in sequence including rice may be benefited from the K residues in the following season. As transformations of different K forms in soils are dynamic, and plant uptake from available form (exchangeable and solution K) is being continuously replenished from non-exchangeable form, the soils with high K bearing minerals virtually do not respond to applied K fertilizers unless the crops are highly K loving.

Sulphur, Calcium and Magnesium: Sulphur and Mg requirements of crops are about the same as that of P while Ca requirement is greater. Reaction of S is similar to that of N, which is dominated by the organic or microbial fraction in the soil. In contrast, Ca and Mg are associated with soil colloidal fractions and behave like K. Organic S accounts for about 90% of the total S in most soils.

Sulphur application is usually beneficial for more than one crops grown in sequence. Response to applied S is more in rice than in wheat or other upland crops. Anaerobic conditions brought about by submergence significantly reduce S availability in soil. So in rice based cropping systems, transplant rice should receive fertilizer S on a priority basis.

Zinc: Zinc deficiency is widespread in the country; much observed in wetland rice soils, sandy soils, and calcareous soils.

Boron: Boron deficiency is frequently observed in mustard, wheat, chickpea and mungbean. Reproductive growth (flowering, fruit and seed set) is more sensitive to B deficiency than vegetative growth.

2.6 Critical limits of nutrients in soils

Critical limit of a nutrient refers to a value below which an economic crop response to the added nutrient is highly expected. The critical limit may be useful for delineating responsive sites from non-responsive ones but are not suited for making quantitative recommendations for a range of soil test values. The critical levels depend on soils, crops and extraction methods (Appendix-8).

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2.7 Nutrient uptake by crops

Nutrient uptake by a crop is the resultant product of the nutrient concentration of that crop and the level of yield including by-product. In general, higher is the yield, higher is the removal of nutrients. Modern varieties of crops absorb relatively higher amounts of nutrients than the traditional varieties. Nutrient uptake by various crops is given in Table 2.

Table 2. Nutrient uptake by various crops at particular level of yields

Crop	Yield (t/ha)	Total nutrient uptake (kg/ha)*			
		N	P	K	S
Rice (MV)	6	108	18	102	11
Wheat	4	118	22	98.5	17
Maize	8	160	29	134	34
Millet	0.7	30	7	53	4
Potato	30	131	20	193	14
Jute	3	98	20	200	35
Cotton	10	26	9	70	-
Tobacco	2	130	18	199	10
Sugarcane	100	140	25	325	51
Mustard	1.5	82	15	91	32
Groundnut	2	170	13	91	15
Soybean	3	220	18	141	20
Sesame	1.2	62	10	53	14
Sunflower	3	120	26	199	15
Chickpea	1.5	91	6	47	13
Lentil	1.0	57	6.5	18	-
Blackgram	1.5	118	10	82	-
Mungbean	1	106	21	59	-
Pigeonpea	1.2	85	8	16	9
Cabbage	70	110	11	120	24
Cauliflower	50	100	18	116	20
Tomato	50	140	29	158	30
Carrot	30	125	24	167	-
Cucumber	40	70	22	100	-
Brinjal	60	175	17	250	-
Pumpkin	50	90	31	133	-
Radish	20	120	26	100	-
Sweetpotato	40	190	33	283	-
Spinach	25	120	20	166	-
Onion	35	120	22	133	26
Banana	40	250	26	350	15
Pineapple	50	185	24	290	2
Tea	2	128	17	60	-

**** Total nutrient uptake (kg/ha) includes nutrient uptake by main product and crop residues.***

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2.8 Nutrient balance

Nutrient Balance is the sum of nutrients inputs minus the sum of nutrients outputs; the balance may be positive or negative. Nutrient Balance may also be termed as Nutrient Budget or Nutrient Audit. Positive balance indicates nutrient accumulation and negative balance shows nutrient depletion (mining). To achieve sustainability, the quantity of nutrients inputs and outputs could be equal. Nutrient mining may eventually cause soil degradation and affect crop production. On the other hand, excess nutrient accumulation may lead to soil and water pollution.

In calculating nutrient balance, fertilizer, manure, BNF, deposition (rain), sedimentation (flood) and irrigation water can be regarded as nutrients inputs, and the crop produce, crop residues, leaching, gaseous losses (leaching and denitrification) and soil erosion as nutrients outputs (Fig. 2). The most vital routes for nutrients inputs are fertilizer and manure, and that for nutrients outputs are crop produce and crop residues. Hence, these major inputs and outputs can be considered for calculating nutrient balance to understand partial or apparent nutrient balance. Nutrient balance values varied with locations, cropping systems and nutrient management practices.

With passage of time, nutrient balance is becoming more negative (Fig. 3). Again, land use with higher cropping intensity may show higher negative balances (Fig. 4). On the other hand, the addition of organic manure may help reduce negative balances; the magnitude depends on the types and amounts of manure. Any reduction of removal of crop residues would have positive influence on nutrient balance and this is especially important for K. Nutrient balance appears to be less negative (Figs. 5 & 6) in Barind areas (AEZs 25, 26 & 27) in comparison with the Brahmaputra, Ganges and Meghna Floodplains (e.g. AEZs 9,11,12, 13 & 17). Incorporation of grain legume residues (e.g mungbean) can reduce nutrient depletion to a considerable extent. Thus grain legume based patterns (e.g. Mustard- Mungbean-T. Aman rice, Wheat- Mungbean-T. Aman rice, Lentil- Mungbean-T. Aman rice etc.) are suggested to cultivate at farm level.

Although the nutrient balance value tells us little about available nutrient status of soils, it has important implications when considering the future long-term total status of nutrients in soils. To minimize nutrient depletion, it is not justified to just increase the use of inorganic fertilizers, rather the organic sources of plant nutrients, especially cowdung, poultry manure, solid waste etc. need to be considered.

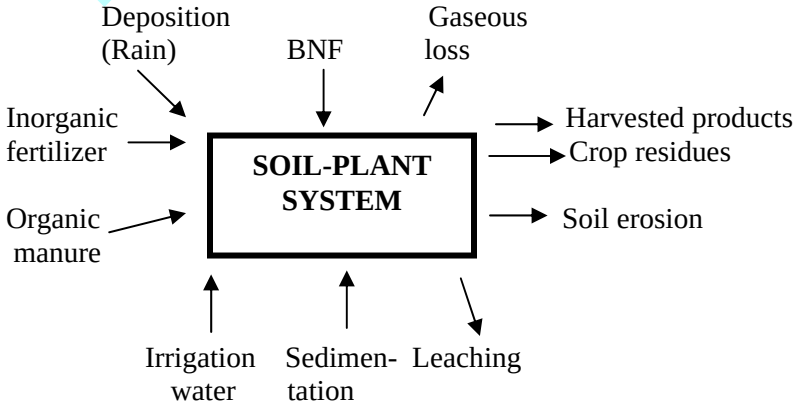

Fig. 2 Nutrient input-output system

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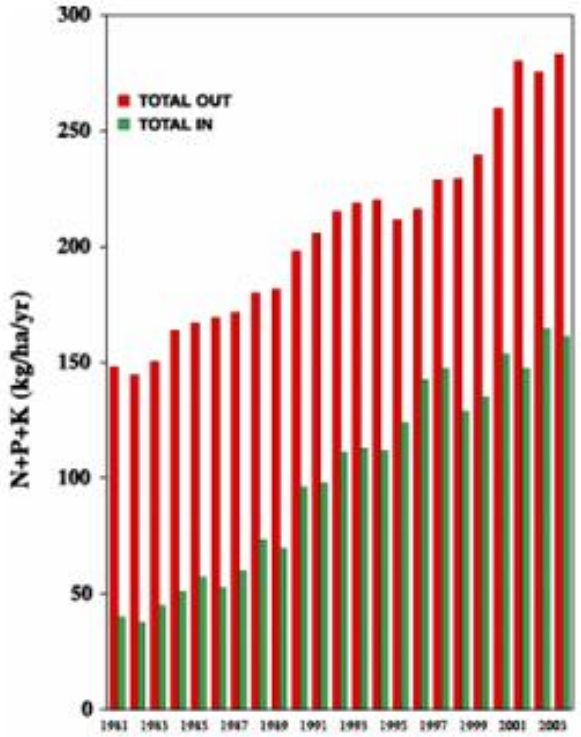

Fig. 3 Total N+P+K Input and Output in Bangladesh

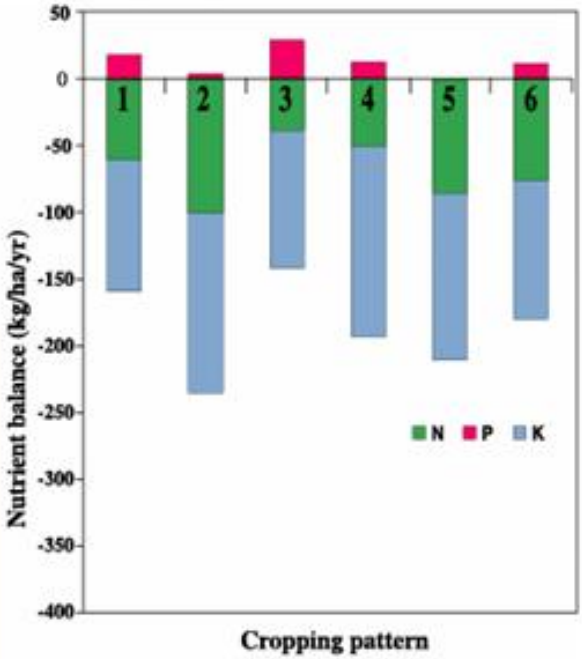

Fig. 4 Nutrient balance in different cropping patterns;
1= Boro - Fallow - T. Aman, 2= Boro - T. Aus-T. Aman,
3= Boro - GM - T. Aman, 4= Mustard - Boro -T. Aman,
5= Wheat - T. Aus - T. Aman, 6= Wheat - Mungbean -T. Aman

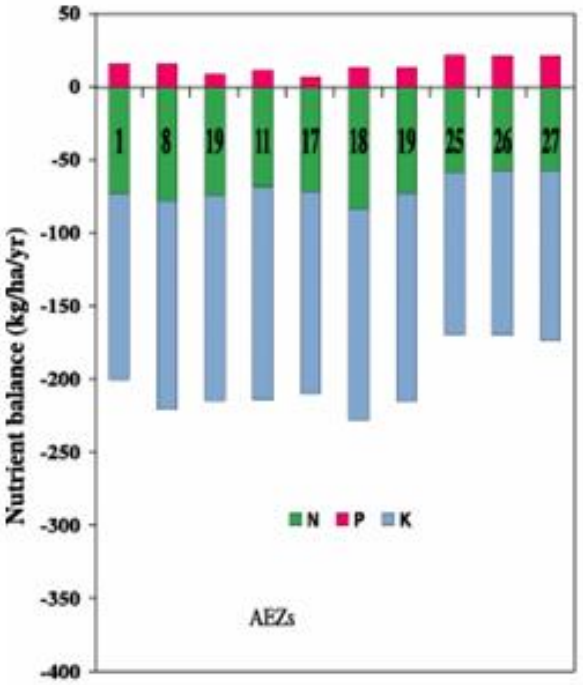

Fig. 5 Nutrient balance in Boro-Fallow-T. Aman rice cropping pattern of different AEZs

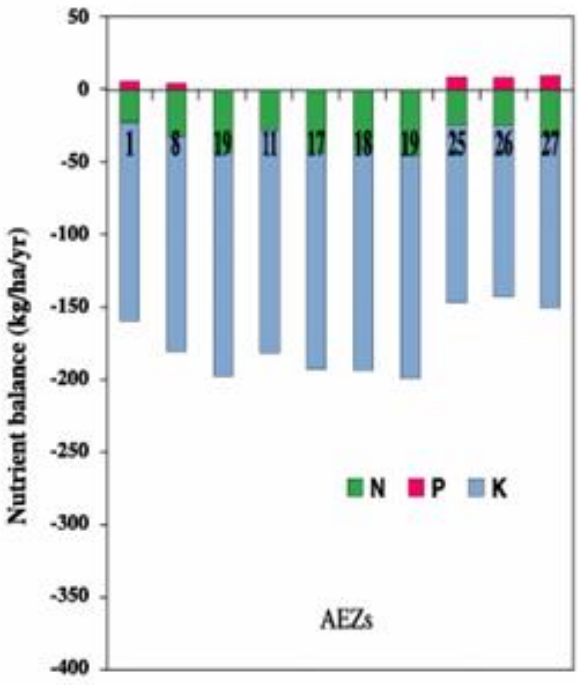

Fig. 6 Nutrient balance in Wheat-Fallow-T. Aman rice cropping pattern of different AEZs

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3. SOIL FERTILITY STATUS OF DIFFERENT AGRO-ECOLOGICAL ZONES

Bangladesh has a wide range of environmental conditions. Environmental diversity occurs not only at national and regional levels, it also occurs at the Upazila and village levels. Besides considerable year to year variability in moisture, the temperature and flood regimes create major problems for planning program on environment and agricultural research, extension and development activities.

Thirty agroecological regions and 88 subregions have been identified by adding successive layers of information on the physical environment which are relevant for land use and assessing agricultural potential. These layers are :

- Physiography (land forms and parent materials)
- Soils and their characteristics
- Depth and duration of seasonal flooding
- Length of the rainfed kharif and rabi growing periods
- Length of the pre-kharif period of unreliable rainfall
- Length of the cool winter period and frequency of occurrence of extremely low (below 0.4^0C) winter temperature.
- Frequency of occurrence of extremely high (> 40^0C) summer temperature.

Agroecological regions and subregions are very broad units. Fertility status of these regions varies considerably. Individual farmers have fragmented the land into small pieces causing wide variation in the management of each and every piece of land. This leads to the large variation in the fertility levels even between adjacent plots. Realizing the difficulties of generalization of fertility level, only an indicative status of the fertility levels of each 30 agroecological regions is given here which serves as a ground for AEZ based fertilizer recommendations for cropping patterns. Area, locations and landtypes of different AEZs of Bangladesh are presented in Table 3. For detailed information about physical and chemical properties of soils, respective Upazila Nirdeshika may be consulted. However, for fertility data of a specific area soil samples should be collected for detailed analysis.

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Table 3. Area, locations and land types of agro-ecological zones of Bangladesh

AEZ No. & Name	Area		Major land types & extent		Locations (districts)
	km^2	ha	Type	Extent (%)	
1. Old Himalayan Piedmont Plain	3982	398154	HL MHL	58 34	Most of Panchagar & Thakurgaon, and north-west part of Dinajpur
2. Active Tista Floodplain	836	83644	HL MHL	2 72	Adjoining channels of Nilphamari, Rangpur, Lalmonirhat, Kurigram & Gaibandha
3. Tista Meander Floodplain	9468	946803	HL MHL	35 51	Most of Rangpur, eastern parts of Panchagar & Dinajpur, northern Bogra and parts of Joypurhat, Naogaon & Rajshahi
4. Karatoya-Bangali Floodplain	2572	257158	HL MHL MLL	23 44 14	Eastern Bogra and most of Sirajganj
5. Lower Atrai Basin	851	85105	MHL MLL LL	8 21 65	Most parts in Naogaon & Natore, and small parts in Rajshahi, Bogra & Sirajganj.
6. Lower Purnabhaba Floodplain	129	12896	MLL LL	10 60	Western parts of Naogaon and northern part of Nawabganj
7. Active Brahmaputra-Jamuna Floodplain	3190	319001	MHL MLL	37 20	Eastern parts of Kurigram, Gaibandha, Bogra, Sirajganj, Pabna & Manikganj
8. Young Brahmaputra-Jamuna Floodplain	5924	592394	HL MHL MLL	18 42 19	Western parts of Sherpur, Jamalpur & Tangail
9. Old Brahmaputra Floodplain	7230	723037	HL MHL MLL	28 35 20	Most parts of Sherpur, Jamalpur, Tangail, Mymensingh, Netrokona, Kishoreganj, Narsingdi & Narayanganj
10. Active Ganges Floodplain	3334	333447	HL MHL MLL	12 33 18	Ganges and lower Meghna channels of Nawabganj & Rajshahi to Meghna estuary in Lakshmipur & Barisal
11. High Ganges River Floodplain	13205	1320549	HL MHL MLL	43 32 12	Nawabganj ,Rajshahi, southern Pabna, Kushtia, Meherpur, Chuadanga, Jhenaidah, Magura, Jessore, Satkhira & Khulna.
12. Low Ganges River Floodplain	7968	796751	HL MHL MLL LL	13 29 31 14	Natore, Pabna, Goalanda, Faridpur, Madaripur, Gopalganj, and Sariatpur, eastern parts of Kushtia, Magura and Narail, north-eastern parts of Khulna & Bagerhat, northern Barisal, and south-western parts of Manikganj, Dhaka & Munshiganj.
13. Ganges Tidal Floodplain	17066	1706573	MHL	78	Barisal, Jhalakati, Pirojpur, Patuakhali, Barguna, Bagerhat, Khulna & Satkhira.
14. Gopalganj – Khulna Bils	2247	224700	MHL MLL LL VLL	13 41 28 11	Madaripur, Gopalganj, Narail, Jessore, Bagerhat & Khulna.
15. Arial Bil	144	14436	MLL LL	13 73	Munshiganj & Dhaka

HL = Highland, MHL =Medium Highland, MLL = Medium Lowland
LL = Lowland, VLL = Very Lowland

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AEZ No. & Name	Area		Major land types & extent		Locations (districts)
	km^2	ha	Type	Extent (%)	
16. Middle Meghna River Floodplain	1555	155464	MLL LL VLL	29 25 11	Parts of Kishoreganj, Brahmanbaria, Comilla, Chandpur, Narsingdi & Narayanganj
17. Lower Meghna River Floodplain	909	90934	HL MHL MLL	14 28 31	Chandpur, Lakshimpur & Noakhali.
18. Young Meghna Estuarine Floodplain	9269	926885	MHL	45	Chittagong, Feni, Noakhali, Lakshmipur, Bhola, Barisal, Patuakhali & Barguna.
19. Old Meghna Estuarine Floodplain	7740	774026	MHL MLL LL	24 33 21	Kishoreganj, Habiganj, Brahmanbaria, Comilla, Chadpur, Feni, Noakhali, Laksmipur, Narsingdi, Narayanganj, Dhaka, Shariatpur, Madaripur, Gopalganj & Barisal.
20. Eastern Surma-Kushiyara Floodplain	4622	462159	MHL MLL LL	25 20 36	Sylhet, Moulvibazar, Sunamganj & Habiganj.
21. Sylhet Basin	4573	457345	MLL LL VLL	19 43 23	Sunamganj, Habiganj, Netrokona, Kishoreganj & Brahmanbaria.
22. Northern and Eastern Piedmont Plains	4038	403758	HL MHL MLL	33 31 16	Sherpur, Netrokona, Sunamganj, Sylhet, Moulivibazar, Habiganj, Brahmanbaria & Comilla
23. Chittagong Costal Plains	3720	372007	HL MHL MLL	17 43 13	Feni, Chittagong & Cox's Bazar
24. St. Martin's Coral Island	8	804	HL MHL	33 63	St. Martin's Island
25. Level Barind Tract	5049	504851	HL MHL	30 55	Dinajpur, Gaibandha, Joypurhat, Bogra, Naogaon, Sirajganj & Natore
26. High Barind Tract	1600	159964	HL	93	Rajshahi, Nawabganj & Naogaon
27. North Eastern Barind Tract	1079	107926	HL MHL	36 56	Dinajpur, Rangpur, Gaibandha, Joypurhat & Bogra
28. Madhupur Tract	4244	424359	HL MHL	56 18	Dhaka, Gazipur, Narsingdi, Narayanganj, Tangail, Mymensingh & Kishoreganj
29. Northern and Eastern Hills	18172	1817172	HL	92	Khagrachhari, Chittagong Hill Tracts, Bandarban, Chittagong, Coxs Bazar, Habiganj & Moulivibazar
30. Akhaura Terrace	113	11324	HL MHL MLL LL	55 11 10 15	Brahmanbaria district & miner areas in Habiganj district

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AEZ 1: Old Himalayan Piedmont Plain (398154 ha)

This distinctive region is developed in Old Tista Alluvial fan extending out from the foot of the Himalayas. It has complex relief pattern comprising broad and narrow floodplain ridges and linear depressions. Deep, rapidly permeable sandy loams and sandy clay loams are predominant in this region. Its topsoils are strongly acidic and sub-soils moderately acidic; rich in weatherable sand minerals. Seven General Soil Types occur in the region of which, Noncalcareous Brown Floodplain soils, Black Terai soils and Noncalcareous Dark Grey Floodplain soils predominate. Organic matter contents are relatively higher (Piedmont area) than the other floodplain areas. The natural fertility of the soil, except the coarse textured, is moderate but well sustained. Soil fertility problems include rapid leaching of N, K, S, Ca, Mg and B.

Major land type	Soil pH	Soil OM	Nutrient status*								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Highland (58 %)	4.0-6.0	L-M	VL-L	L-M	VL-L	L-M	L	L	L	L	L-M
Medium highland (34%)	4.0-6.5	L-M	VL-L	L-M	VL-L	L-M	L	L	L	L	L-M

OM = Organic matter

VL = Very low Opt = Optimum

L = Low H = High

M = Medium VH = Very high

* The range of soil test values for each type of interpretation (e,g, VL) is given in Appendix-8

AEZ 2: Active Tista Floodplain (83644 ha)

This region includes the active floodplains of the Tista, Dharla and Dudkumar rivers. It has complex patterns of low, generally smooth ridges, inter-ridge depressions, river channels and cut-off channels.

The area has irregular patterns of grey stratified sands and silts. They are moderately acidic throughout and parent alluvium is rich in weatherable minerals. Four General Soil Types occur in the region of which, Noncalcareous Alluvium predominates. Organic matter content is low and CEC is medium. Soil fertility level, in general, including Mg and B status is low to medium.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Medium highland (72%)	5.2-6.9	L	VL-L	L	L-M	L	L	L-M	L	L	L-M

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AEZ 3. Tista Meander Floodplain (946803 ha)

This region occupies major part of the Tista Floodplain as well as the floodplain of the Atrai, Little Jamuna, Karatoya, Dharla and Dudkumar rivers.

Most areas have broad floodplain ridges and almost level basins. There is overall pattern of olive brown, rapidly permeable, loamy soils on the floodplain ridges, and grey or dark grey, slowly permeable, heavy silt loam or silty clay loam soils on the lower land and parent materials rich in weatherable minerals. Eight General Soil Types occur in the region of which, Noncalcareous Grey Floodplain and Noncalcareous Brown Floodplain soils predominate. They are moderately acidic throughout, low in organic matter content on the higher land, but moderate in the lower parts. Fertility level, in general, is low to medium but the status of K and CEC is medium in most of the places. Soils in general have a good moisture holding capacity.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Highland (35 %)	4.6-6.5	L	VL-L	L-M	L-M	L	L	L	L	L	L-M
Medium highland (51%)	4.9-7.0	L	VL-L	L-M	M	L	L	L	L	L	L-M

AEZ 4. Karatoya-Bangali Floodplain (257158 ha)

This floodplain apparently comprises a mixture of the Tista and Brahmaputra sediments. Most areas have smooth, broad, floodplain ridges and almost level basins.

The soils are grey silt loams and silty clay loams on ridges and grey or dark grey clays in basins. Five General Soil Types occur in the region of which, Noncalcareous Grey Floodplain and Noncalcareous Dark Grey Floodplain soils predominate. They are moderately acidic throughout. Organic matter content is low in ridge soils and moderate in basins. General fertility level is medium.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Highland (23 %)	4.7-7.8	L	VL-L	L-M	L	L-M	Opt	Opt	L-M	L-M	Opt
Medium highland (44%)	5.4-7.9	L	VL-L	L-M	L	L-M	Opt	Opt	L-M	L-M	Opt
Medium lowland (14%)	6.2-7.7	L	VL-L	L-M	L	L-M	Opt	Opt	L-M	L-M	Opt

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AEZ 5. Lower Atrai Basin (85105 ha)

This region comprises low lying areas between the Barind Tract and the Ganges River Floodplain. The smooth, low lying, basin land occupies most of the region. Dark grey, heavy, acidic clays predominate. Seven General Soil Types occur in the region, but Noncalcareous Dark Grey Floodplain soils cover most of the areas. Organic matter, CEC and status of essential nutrients are low to medium.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Medium Lowland (21 %)	4.8-6.8	M	L	L	M	L-M	Opt	Opt	L-M	M-Opt	Opt
Lowland (65%)	4.8-7.4	M	L	L	M	L-M	Opt	Opt	L-M	M-Opt	Opt

AEZ 6. Lower Purnabhaba Floodplain (12896 ha)

This region occupies basins and bils separated by low floodplain ridges. In this area, dark grey, mottled red, very strongly acid, heavy clays occupy both ridge and basin sites. Only one General Soil Type, Acid Basin Clays has been identified in the region. Organic matter status is medium to high with high CEC. General fertility level is medium.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Lowland (60%)	4.5-5.7	M	L	L-M	M	M	Opt	Opt	L-M	Opt	Opt

AEZ 7. Active Brahmaputra-Jamuna Floodplain (319001 ha)

This region comprises the belt of unstable alluvial land along the Brahmaputra-Jamuna rivers where land is constantly being formed and eroded by shifting river channels. It has an irregular relief of broad and narrow ridges and depressions.

The area is occupied by sandy and silty alluvium, rich in weatherable minerals with slightly alkaline in reaction. Six General Soil Types occupy the area of which, only Non Calcareous Alluvium predominates. Organic matter status is low and fertility status is low to medium. Nitrogen is limiting whereas the K, S and Zn status is low to medium.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Medium highland (37 %)	5.7-8.2	L	L	L-M	L-M	L-M	L-M	L-M	L-M	L-M	M
Medium lowland (20%)	6.0-8.2	L	L	L-M	L-M	L-M	L-M	L-M	L-M	L-M	M

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AEZ 8. Young Brahmaputra and Jamuna Floodplain (592394 ha)

The region comprises the area of Brahmaputra sediments. It has a complex relief of broad and narrow ridges, inter-ridge depressions, partially in filled cut-off channels and basins.

This area is occupied by permeable silt loam to silty clay loam soils on the ridges and impermeable clays in the basins; neutral to slightly acid in reaction. General Soil Types include predominantly Grey Floodplain soils. Organic matter content is low in ridges and moderate in basins. Soils are deficient in N, P and S but the status of K and Zn is medium.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Highland (18 %)	5.6-7.5	VL-L	VL-L	L	M	L	M	M	L-M	L-M	M
Medium highland (42%)	5.4-7.5	VL-L	VL-L	L	M	L	M	M	L-M	L-M	M
Medium lowland (19%)	5.4-7.5	L	L	L	M	L	M	M	L-M	L-M	M

AEZ 9: Old Brahmaputra Floodplain (723037 ha)

This region occupies a large area of Brahmaputra sediments before the river was diverted to its present Jamuna channel about 200 years ago. The region has broad ridges and basins.

Soils of the area are predominantly silt loams to silty clay loams on the ridges and clay in the basins. General Soil Types predominantly includes Dark Grey Floodplain soil. Organic matter content is low on the ridges and moderate in the basins, topsoils moderately acidic and subsoils neutral in reaction. General fertility level is low. However, the status of P and CEC is medium and the K status is low.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Highland (28 %)	4.5-7.4	L	VL-L	L-M	L	L-M	Opt	Opt	L-M	L-M	Opt
Medium highland (35%)	4.7-7.2	L	VL-L	L-M	L	L-M	Opt	Opt	L-M	L-M	Opt
Medium lowland (20%)	4.5-7.2	L	VL-L	L-M	L	L-M	Opt	Opt	L-M	L-M	Opt

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AEZ 10: Active Ganges Floodplain (333447 ha)

This region occupies unstable alluvial land within and adjoining Ganges river. It has irregular relief of broad and narrow ridges and depressions.

The area has complex mixtures of calcareous sandy, silty and clayey alluvium. The General Soil Types predominantly include Calcareous Alluvium and Calcareous Brown Floodplain soils. Soils are low in organic matter and slightly alkaline in reaction. General fertility level is medium with high CEC but deficient in N, P and Zn contents. Boron status is medium.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Highland (12 %)	7.1-8.1	L	L	L-M	M	L-M	H	H	L	M	M
Medium highland (33%)	7.1-8.1	L	L	L-M	M	L-M	H	H	L	M	M
Medium lowland (18%)	7.1-8.1	L	L	L-M	M	L-M	H	H	L	M	M

AEZ 11. High Ganges River Floodplain (1320549 ha)

This region includes the western part of the Ganges River Floodplain which is predominantly high land and medium highland. Most areas have a complex relief of broad and narrow ridges and inter-ridge depressions, separated by areas with smooth, broad ridges and basins.

There is an overall pattern of olive-brown silt loams and silty clay loams on the upper parts of floodplain ridges and dark grey mottled brown, mainly clay soils on ridge sites and in basins. Most ridge soils are calcareous throughout. General Soil Types predominantly include Calcareous Dark Grey Floodplain soils and Calcareous Brown Floodplain soils. Organic matter content in the brown ridge soils is low but higher in the dark grey soils. Soils are slightly alkaline in reaction. General fertility level is low although CEC is medium and K-bearing minerals are medium to high but the Zn and B status is low to medium.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Highland (43 %)	5.9-8.1	L	VL-L	L-M	M	L-M	Opt-H	Opt-H	L-M	L-M	M
Medium highland (32 %)	6.0-8.1	L-M	VL-L	L-M	M	L-M	Opt-H	Opt-H	L-M	L-M	M
Medium lowland (12 %)	6.5-8.3	L-M	L	L-M	M	L-M	Opt-H	Opt-H	L-M	L-M	M

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AEZ 12. Low Ganges River Floodplain (796751 ha)

The region comprises the eastern half of the Ganges River Floodplain which is low-lying. The region has a typical meander floodplain landscape of broad ridges and basins.

Soils of the region are silt loams and silty clay loams on the ridges and silty clay loam to heavy clays on lower sites. General Soil Types predominantly include Calcareous Dark Grey and calcareous Brown Floodplain soils. Organic matter content is low in ridges and moderate in the basins. Soils are calcareous in nature having neutral to slightly alkaline reaction. General fertility level is medium with high CEC and K status and the Zn and B status is medium.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Highland (13 %)	6.8-8.2	L	VL-L	L-M	M-Opt	L-M	Opt-H	Opt-H	L-M	M-Opt	Opt
Medium highland (29 %)	6.2-8.3	L-M	VL-L	L-M	M-Opt	L-M	Opt-H	Opt-H	L-M	M-Opt	Opt
Medium lowland (31 %)	6.0-8.3	L-M	L	L	M-Opt	L-M	Opt-H	Opt-H	L-M	M-Opt	Opt
Lowland (14%)	6.0-7.7	M	L	L	M-Opt	L-M	Opt-H	Opt-H	L-M	M-Opt	Opt

AEZ 13. Ganges Tidal Floodplain (1706573 ha)

This region occupies an extensive area of tidal floodplain land in the south-west of the country. The grater part of this region has smooth relief having large areas of salinity.

There is a general pattern of grey, slightly calcareous, heavy soils on river banks and grey to dark grey, noncalcareous, heavy silty clays in the extensive basins. Noncalcareous Grey Floodplain soil is the major component of General Soil Types. Acid Sulphate soils also occupy significant part of the area where it is extremely acidic during dry season. In general, most of the topsoils are acidic and subsoils are neutral to mildly alkaline. Soils of the Sundarban area are alkaline. General fertility level is high with medium to high organic matter content and very high CEC and K status but have limitations of high exchangeable Na and low Ca/Mg ratio. The Zn status is low to medium and the B and S status is high.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Medium highland (78%)	4.2-8.1	L-M	VL-L	VL-L	Opt-H	Opt-H	Opt-H	Opt-H	L-M	Opt-H	Opt

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AEZ 14. Gopalganj-Khulna Bils (224700 ha)

The region occupies extensive low-lying areas between the Ganges River Floodplain and the Ganges Tidal Floodplain. Almost level, low-lying basins occupy most of the region, with low ridges along rivers and creeks.

Soils of the area are grey and dark grey acidic heavy clays, overlie peat or muck at 25-100 cm. Soft peat and muck occupy perennially wet basin centres. General Soil Types include mainly Peat and Noncalcareous Dark Grey Floodplain soils. Organic matter content is medium to high. They have low bearing capacity when wet, potentially strongly acid and low in P and Zn status. Fertility level is medium.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Medium highland (13%)	5.0-7.7	H	Opt-H	L	Opt	H	Opt	Opt	L	M	Opt
Medium lowland (41%)	5.0-7.4	H	Opt-H	L	Opt	H	Opt	Opt	L	M	Opt
Lowland (28%)	4.3-6.7	H	Opt-H	L	Opt	H	Opt	Opt	L	M	Opt
V.lowland (11%)	4.3-6.7	H	Opt-H	L	Opt	H	Opt	Opt	L	M	Opt

AEZ 15. Arial Bil (14436 ha)

This region occupies a low lying basin between the Ganges and Dhaleshwari rivers in the south of the former Dhaka district

The soils of this area are dark grey, acidic heavy clays. A noncalcareous Dark Grey Floodplain soil is the major General Soil Type. Organic matter content generally exceeds 2% in the top and subsoil. Available moisture holding capacity is inherently low. They have high CEC, and general fertility level is medium to high.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Medium lowland (13%)	5.3-6.8	M-H	L	L-M	M-Opt	M-Opt	Opt	Opt	M	Opt	Opt
Lowland (73%)	4.7-5.4	M-H	L	L-M	M-Opt	M-Opt	Opt	Opt	M	Opt	Opt

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AEZ 16. Middle Meghna River Floodplain (155464 ha)

This region occupies abandoned channel of the Brahmaputra river on the border between the greater Dhaka and Comilla districts. This region includes islands – former Brahmaputra chars, within the Meghna river as well as adjoining parts of the mainland.

Soils of the area are grey, loamy on the ridges and grey to dark grey clays in the basins. Grey sands to loamy sands with compact silty topsoil occupy areas of Old Brahmaputra char. Dominant General Soil type is Noncalcareous Grey Floodplain soils. Topsoils are strongly acidic and subsoils moderately acidic to slightly alkaline. General fertility level is medium with low N and organic matter contents. The P, Zn and B levels are low to medium.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Medium lowland (29%)	4.9-7.0	L-M	L	L-M	L	M-Opt	Opt	M-Opt	L-M	L-M	Opt
Lowland (25%)	4.1-6.8	M	L	L-M	L	M-Opt	Opt	M-Opt	L-M	L-M	Opt
Very lowland (11%)	4.6-5.5	M	L	L-M	L	M-Opt	Opt	M-Opt	L-M	L-M	Opt

AEZ 17. Lower Meghna River Floodplain (90934 ha)

This area occupies transitional area between Middle Meghna River Floodplain and the Young Meghna Estuarine Floodplain. The region has slightly irregular relief, but with little difference in elevation between the ridges and depressions.

Soils of this area are relatively uniform, silt loams occupy relatively higher areas and silty clay loams occupy the depressions. Noncalcareous Dark Grey Floodplain and Calcareous Grey Floodplain soils are major components of General Soil Types. Topsoils are moderately acidic and subsoils neutral in reaction. General fertility level is medium to high with low to medium organic matter status and K-bearing minerals.

Major land type	Soil pH	Soil	Nutrient status								
		OM	N	P	K	S	Ca	Mg	Zn	B	Mo
Highland (14 %)	5.5-6.3	L-M	VL-L	L-M	L-M	L-M	Opt-H	Opt-H	M-Opt	M	M
Medium highland (28%)	4.8-7.1	L-M	L	L-M	L-M	L-M	Opt-H	Opt-H	M-Opt	M	M
Medium lowland (31%)	5.1-7.8	L-M	L	L-M	L-M	L-M	Opt-H	Opt-H	M-Opt	M	M

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AEZ 18. Young Meghna Estuarine Floodplain (926885 ha)

This region occupies young alluvial land in and adjoining the Meghna estuary. It is almost level with very low ridges and broad depressions. The major soils are grey to olive, deep, calcareous silt loam and silty clay loams and are stratified either throughout or at shallow depth. Calcareous Alluvium and Noncalcareous Grey Floodplain soils are the dominant General Soil Types. The soils in the south become saline in dry season. Top soils and subsoils of the area are the dominant General Soil Types. The soils in the south become saline in dry season. Top soils and subsoils of the area are mildly alkaline. General fertility is medium but low in N and organic matter. Sulphur status is medium to high.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Medium highland (45%)	4.8-8.4	L-M	VL-L	L-M	M-Opt	M-Opt	Opt-H	Opt-H	L-M	Opt	Opt

AEZ 19. Old Meghna Estuarine Floodplain (774026 ha)

This region occupies a large area, mainly low lying between the south of the Surma-Kushiyara Floodplain and the northern edge of the Young Meghna Estuarine Floodplain. It comprises smooth, almost level, floodplain ridges and shallow basins.

Silt loam soils predominate on highlands and silty clay to clay in lowlands. A noncalcareous Dark Grey Floodplain soil is the only General Soil Types of the area. Organic matter content of the soils is moderate. Moisture holding capacity is medium. Topsoils are moderately acidic, but subsoils neutral in reaction. General fertility level is medium. Status of K is low in uplands and low to moderate in lowlands. Levels of P, S, Zn and B are low to medium.

Major land type	Soil pH	Soil	Nutrient status								
		OM	N	P	K	S	Ca	Mg	Zn	B	Mo
Medium highland (24%)	4.4-7.8	L-M	VL-L	L-M	L-M	L-M	Opt	Opt	L-M	L-M	Opt
Medium lowland (33%)	5.5-7.7	M	VL-L	L-M	L-M	L-M	Opt	Opt	L-M	L-M	Opt
Lowland (21%)	5.7-6.9	M	L	L-M	L-M	L-M	Opt	Opt	L-M	L-M	Opt

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AEZ 20. Eastern Surma-Kushiyara Floodplain (462159 ha)

This region occupies the relatively higher parts of the Surma-Kushiyara Floodplain formed on sediments of the rivers draining into the Meghna catchment area from the hills. The area is mainly smooth, broad ridges and basins.

This area is occupied by grey, heavy silty clay loams on the ridges and clays in the basins. Noncalcareous Grey Floodplain soils is the only General Soil Type. Organic matter content of the soil is moderate. Soil reaction ranges from strongly acidic to neutral. Levels of CEC and Zn are medium while the status of P, K and B is low.

Major land type	Soil pH	Soil	Nutrient status								
		OM	N	P	K	S	Ca	Mg	Zn	B	Mo
Medium highland (25%)	4.4-6.5	L-M	VL-L	L	L	L-M	L-M	L-M	M	L-M	M
Medium lowland (20%)	4.6-6.0	L-M	VL-L	L	L	L-M	L-M	L-M	M	L-M	M
Lowland (36%)	4.3-7.6	M	L	L	L	L-M	L-M	L-M	M	L-M	M

AEZ 21. Sylhet Basin (457345 ha)

The region occupies the lower, western side of the Surma-Kushiyara Floodplain. The area is mainly smooth, broad basins with narrow ridges of higher land along rivers.

Soils of the area are grey silty clay loams and clay loam on the higher parts that dry out seasonally and grey clays in the wet basins. Noncalcareous Grey Floodplain soils and Acid Basin Clays are the major components of the general soil types. The soils have moderate content of organic matter and soil reaction is mainly acidic. Fertility level is medium to high with medium P and Zn contents.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Medium Lowland (19%)	4.8-6.0	L-M	L	L-M	L-M	M-Opt	M-Opt	M-Opt	M-Opt	Opt	Opt
Lowland (43%)	4.8-6.0	M	L	L-M	L-M	M-Opt	M-Opt	M-Opt	M-Opt	Opt	Opt
Very lowland (32%)	4.8-6.0	M	L	L-M	L-M	M-Opt	M-Opt	M-Opt	M-Opt	Opt	Opt

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AEZ 22. Northern and Eastern Piedmont Plains (403758 ha)

This is a discontinuous region occurring as a narrow strip of land at the foot of the northern and eastern hills. The area comprises merging alluvial fans which slope gently outward from the foot of the hills, into smooth, low lying basin.

Grey Piedmont soils and Noncalcareous Grey Floodplain soils are the major General Soil Types of the area. Soils of the area are loams to clays in texture having slightly acidic to strongly acidic reaction. General fertility level is low to medium.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Highland (33%)	4.2-6.1	VL-L	VL-L	L	L	L	L-M	L-M	M	L-M	L
Medium highland (31%)	4.2-6.1	VL-L	VL-L	L	L	L	L-M	L-M	M	L-M	L
Medium lowland (16%)	4.2-6.0	L	VL-L	L	L	L	L-M	L-M	M	L-M	L

AEZ 23. Chittagong Coastal Plains (372007 ha)

This region occupies the plain land in greater Chittagong district and the eastern part of Feni district. It is a compound unit of piedmont, river, tidal and estuarine floodplain landscapes. The major problem in these soils is high salinity during dry season (October to May).

Grey silt loams and silty clay loam soils are predominant. Acid Sulphate soils which are potentially extremely acidic occur in mangrove tidal floodplains. Noncalcareous Grey Floodplain soils, Noncalcareous Alluvium and Acid Sulphate soils are the major components of the General Soil Types of the area. General fertility level of the soils is medium, and N and K are limiting. Status of S is high. Organic matter content is low to moderate and the status of Zn and B is medium.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Highland (17 %)	4.3-6.0	L-M	L	VL-L	L-M	M-Opt	L-M	L-M	L-M	L-M	M
Medium highland (43%)	4.4-6.2	L-M	L	VL-L	L-M	M-Opt	L-M	L-M	L-M	L-M	M
Medium lowland (13%)	4.6-6.0	M	L	VL-L	L-M	M-Opt	L-M	L-M	L-M	L-M	M

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AEZ 24. St. Martin`s Coral Island (804 ha)

This small but distinctive region occupies the whole of St. Martin`s Island in the extreme south of the country. The area has very gently undulating old beach ridges and inter-ridge depressions, surrounded by sandy beaches.

The soils are developed entirely on old and young coral beach sands. Calcareous Alluvium is the only General Soil Type of the area. General fertility level is low with poor moisture holding capacity.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Highland (33 %)	4.6-7.8	VL-L	VL-L	VL-L	L-M	Opt-H	Opt-H	Opt-H	L	H	M
Medium highland (63%)	4.6-7.8	VL-L	VL-L	VL-L	L-M	Opt-H	Opt-H	Opt-H	L	H	M

AEZ 25. Level Barind Tract (504851 ha)

This region is developed over Madhupur Clay. The landscape is almost level, locally irregular along river channels. The predominant soils have a grey, silty, puddled topsoil with ploughpan, which either directly overlies grey, heavy, little weathered Madhupur Clay or merges with the porous, silt loam or silty clay loam subsoils which overlies strongly acid clay at greater depth. Shalow Grey Terrace soils and Deep Grey Terrace soils are the major components of General Soil Types of the area. The soils are low in available moisture holding capacity and slightly aicdic to strongly acidic in reaction. Organic matter status is very low and most of the available nutrients are limiting.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Highland (30 %)	4.3-6.1	VL-L	VL-L	L-M	L	L-M	L-M	L-M	L-M	L-M	L-M
Medium highland (55%)	4.8-7.1	VL-L	VL-L	L-M	L	L-M	L-M	L-M	L-M	L-M	L-M

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AEZ 26. High Barind Tract (159964 ha)

It includes the south-western part of the Barind Tract where the underlying Madhupur clay has been uplifted and cut into by deep valleys.

The soils include puddeld silt loam to silty clay loam in the topsoils and porous silt loam with mottled plastic clay at varying depth. Deep Grey Terrace soils and Grey Valley soil are the major components of the General Soil Types of the area. General fertility status is low having low status of organic matter, including low status of P & K and medium status of Zn and B.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Highland (93 %)	4.1-7.6	VL-L	VL-L	VL-L	L	L	L-M	L-M	L-M	L-M	L-M

AEZ 27. North Eastern Barind Tract (107926 ha)

This region occupies several discontinuous areas on the north-eastern margins of the Barind Tract. It stands slightly higher than adjoining floodplain land.

The region has silty or loamy topsoil and clay loams to clay subsoils and grades into strongly mottled clay. The Madhupur Clay underlying this region is deeply weathered. Deep Red Brown Terrace soils and Deep Grey Terrace soils are the major components of the General Soil Types of the area. The soils are strongly acidic in reaction. Organic matter of the soils is low. General fertility level is poor with medium status of Zn.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Highland (36%)	4.3-6.6	VL-L	VL-L	L-M	L-M	L	L-M	L-M	L-M	L-M	L-M
Medium highland (56%)	4.6-6.4	VL-L	VL-L	L-M	L-M	L	L-M	L-M	L-M	L-M	L-M

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AEZ 28. Madhupur Tract (424329 ha)

This is a region of complex relief and soils are developed over the Madhupur Clay, The landscape comprises level upland, closely or broadly dissected terraces associated with either shallow or broad deep valleys.

Eleven General Soil Types exist in the area of which, Deep Red Brown Terrace, Shallow Red Brown Terrace soils and Acid Basin Clays are the major ones. The soils on the terrace are better drained, friable clay loams to clays overlying friable clay substratum at varying depths. Soils in the valleys are dark grey heavy clays. They are strongly acidic in reaction with low status of organic matter, low moisture holding capacity and low fertility level. The soils are mainly phosphate fixing, and low in P, K, S and B levels.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Highland (56 %)	4.1-6.2	L	VL-L	L	L	L	L-M	L-M	L-M	L-M	L-M
Medium highland (18 %)	4.4-6.5	L	VL-L	L	L	L	L-M	L-M	L-M	L-M	L-M

AEZ 29. *Northern and Eastern Hills (1817172 ha)*

This region includes the country's hill areas. Relief is complex. Hills have been dissected to different degrees over different rocks. In general, slopes are very steep and few low hills have flat summits.

The major hill soils are yellow-brown to strong brown, permeable, friable, loamy; very strongly acidic and low in moisture holding capacity. However, soil patterns generally are complex due to local differences in sand, silt and clay contents of the underlying sedimentary rocks and in the amount of erosion that has occurred. Brown Hill soils is the predominant General Soil Types of the area. Organic matter content and general fertility level are low.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Highland (92 %)	4.1-7.1	L-M	VL-L	L	L-M	L-M	L-M	L-M	L-M	L-M	L-M

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AEZ 30. Akhaura Terrace (11324 ha)

This small region occupies the eastern border of Brahmanbaria and southwest corner of Habiganj district. In appearance, the region resembles Madhupur Tract with level upland, dissected by mainly deep, broad valleys.

The main soils on the upland have strong brown clay which grades into red mottled clay substratum. The valley soils range from silty clay loams to clays. Deep Red Brown Terrace soil, Grey Piedmont soils and Acid Basin Clays are the major components of the General Soil Types of the area. The general fertility including organic matter status is low. The soils are strongly acidic in reaction.

Major land type	Soil pH	Soil OM	Nutrient status								
			N	P	K	S	Ca	Mg	Zn	B	Mo
Highland (55 %)	5.5-6.5	VL-L	VL-L	L	L	L	L	L	L-M	L-M	L-M
Medium highland (11 %)	5.5-6.5	VL-L	VL-L	L	L	L	L	L	L-M	L-M	L-M
Medium lowland (10 %)	5.5-6.5	VL-L	VL-L	L	L	L	L	L	L-M	L-M	L-M
Lowland (15 %)	5.5-6.5	VL-L	VL-L	L	L	L	L	L	L-M	L-M	L-M

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4. CROP RESPONSE TO ADDED NUTRIENTS AND FERTILIZER RECOMMENDATIONS

4.1 Biological response

Response of a crop to added nutrients depends on soil-crop-climatic variables and production practices. In general, most of the soils and crops are responsive to N fertilizers. Upland and rabi crops grown under strongly acid and alkaline soil conditions are more responsive to P fertilizers. Oil seed crops and wetland rice are responsive to S fertilizers. Sugarcane and tuber crops are more responsive to K fertilizers. Crops grown on light textured soils respond more to K fertilizers. Crops grown on the calcareous and saline soils respond more to Zn fertilizers. Fertilizer response is more pronounced under irrigated than under rainfed ecosystems. Crops may differ markedly in their requirements of different nutrients. Again soil moisture content may affect the response of a crop to fertilizers. Furthermore, fertilizer response of a crop depends on the kinds of fertilizers used, and also on the time and methods of their application.

From the field trials conducted by OFRD(BARI), it appeared that the average grain yield of two rice crops was 5.0 t/ha/yr without any added fertilizers or manures (Fig. 7), and the yield increased to above 10 t/ha/yr when nutrients were added on HYG basis from both inorganic and organic sources (IPNS). About 9 t/ha/yr yield was obtained from farmers' practice of fertilizer use.

The response of a crop to added nutrients shows a well-defined pattern. When any growth parameter or yield of a crop is plotted as a function of increasing amounts of applied nutrients, successive increments of nutrients give successively smaller increases in crop growth or yield. Such curves are known as growth response curves. From the response function equation the value of an added nutrient that maximizes yield is estimated as follows:

$Y = a+bx+cx^2$

where Y is the maximum crop growth or yield
a, b and c are co-efficients and
X is added nutrient

The optimum nutrient rate (Ny) can be computed from the equation as

$$Ny = \frac{-b}{2c}$$

Now, the nutrient rate that maximizes profit:

$$Np = \frac{1}{2c}\left(\frac{Pf}{Py} - b\right)$$

Where, Pf = Price of nutrient and Py = price of crop product

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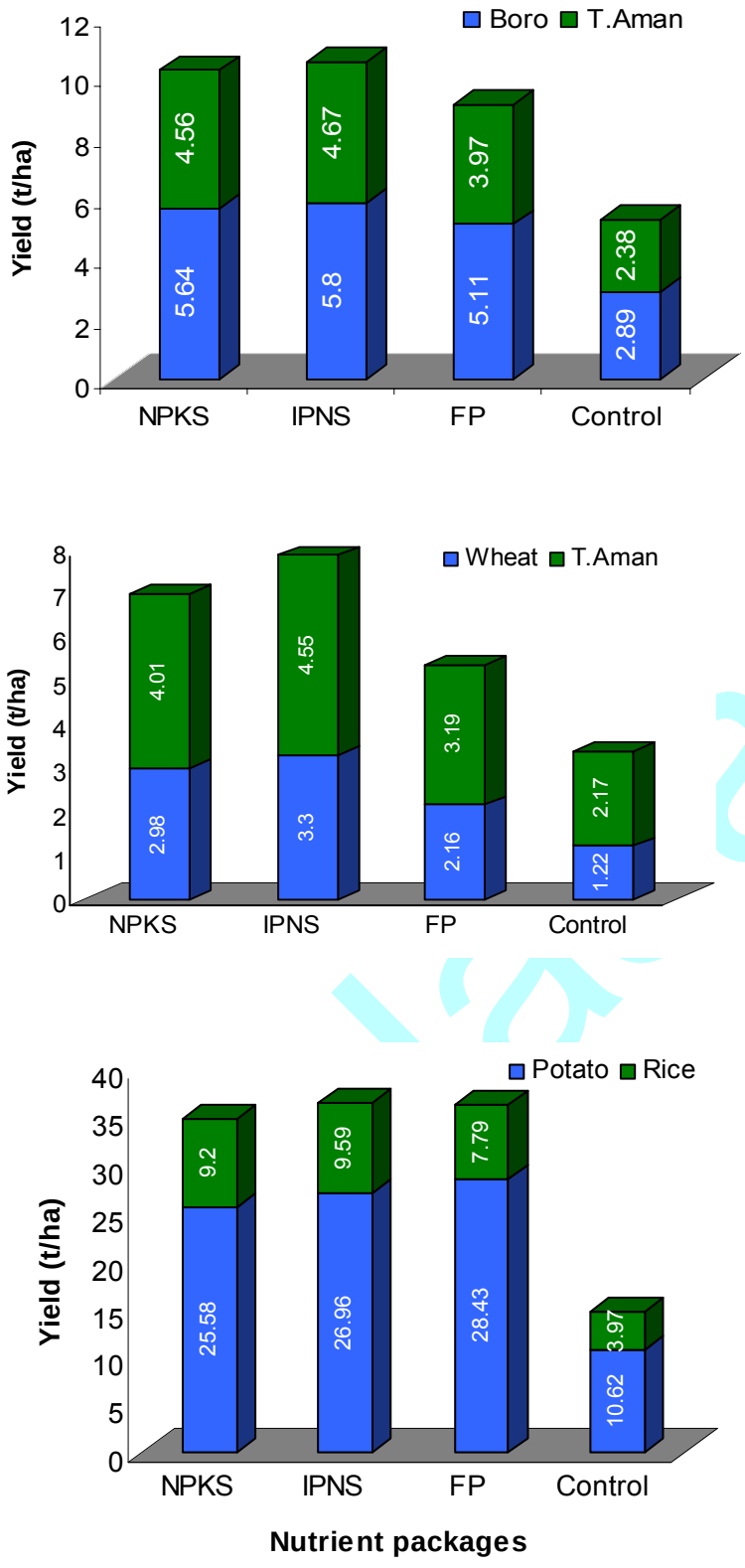

Fig. 7 Yield of crops grown in different sequences as influenced by different nutrient management packages

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4.2 Socio-economic aspects on the balanced use of fertilizers

AEZ based balanced fertilizer management refers to a blanket dose of fertilizers for a particular area (AEZ) based on crop requirement and soil fertility status. These recommendations are based on fertilizer response to different crops, costs of fertilizers and outputs. During SFFP surveys it was evident that, some SFFP demonstration farmers deviate from the use of AEZ based recommended dose of balanced fertilizers (higher or lower) on consideration of the soil fertility condition for a specific plot within the AEZ. However, the following socio-economic factors may be considered for making local recommendations on the balanced use of fertilizers for different crops/cropping patterns.

Socio-economic factors	Socio-economic issues should be considered in making local level fertilizer recommendation
Farm size	• Marginal and small farmers having no other alternative sources of cash money may not be able to use balanced doses of fertilizers. • For medium and large farmers it may be easier to invest more money for use of balanced doses of fertilizers.
Credit facilities	Lack of institutional sources of credit facilities sometimes hamper the use of balanced doses of fertilizers.
Share cropping	In this system of cultivation the tenant farmers will not be willing to use balanced doses of fertilizers unless the landlord shares the cost of fertilizers in proportion to the output sharing with the tenant farmers.
Change of price of fertilizers	If the fertilizer prices increase farmers may use less or unbalanced dose of fertilizers.
Change of price of outputs	If the price of output falls down farmers will not be willing to use proper doses of fertilizers to avert the risk of investment.
Lack of knowledge on the balanced dose of fertilizers and IPNS	• Lack of knowledge about the advantage of using balanced dose of fertilizers. • Farmers do not know how much chemical fertilizer is to be reduced when organic matter is added to the soils.

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5. FERTILIZER

Broadly a fertilizer may be defined as any substance (chemical, organic and microbial) that is added to soil to supply element(s) required for the nutrition of plants. In a specific sense, fertilizers are chemicals that occur naturally or are produced in the factory and when added to the soil, supply nutrient elements required for better plant growth. Some examples of different fertilizers:

Chemical fertilizers	:	Urea, TSP, MOP, Gypsum and Boric acid
Organic fertilizers	:	Cowdung, Farmyard manure, Poultry manure and Compost
Bio-fertilizers	:	Rhizobium, Azospirillum and Blue-Green Algae

5.1 Types of fertilizer/fertilizer material

1. **Inorganic (Mineral) fertilizer**- Fertilizer contains nutrients in the form of inorganic salts obtained by extraction and/or by physical and/or chemical industrial processes.
2. **Organic fertilizer**- Carbonaceous materials mainly of vegetable and/or animal origin added to the soil specifically for the nutrition of plants.
3. **Straight fertilizer**- A qualification generally given to a nitrogenous, phosphatic, or potassic fertilizer having only one primary plant nutrient, i.e. nitrogen, phosphorous or potassium. .
4. **Micronutrient fertilizer**-Any fertilizer containing micronutrient element(s) (Zinc, Boron, Iron, Manganese, Copper, Molybdenum or Chlorine), which required in small amount but essential for plant growth.
5. **Complete fertilizer**- A fertilizer that contains three major plant nutrients- N, P & K.
6. **Compound fertilizer**- A fertilizer that contains at least two of the plant nutrients nitrogen, phosphorous and potassium obtained chemically or by blending or both.
7. **Complex fertilizer**- A compound fertilizer, containing nutrient elements that have undergone chemical interaction during manufacturing.
8. **Blended fertilizer**- A fertilizer containing at least two of the plant nutrients nitrogen, phosphorous, and potassium, prepared by blending.
9. **Granular fertilizer**- Solid material that is formed into particle of a predetermined mean size.
10. **Coated fertilizer**- Granular fertilizer that is coated with a thin layer of different materials in order to improve the behaviour and/or modify the characteristics of the fertilizer.
11. **Slow-release fertilizer**- A fertilizer whose nutrients are present as a chemical compound or whose physical state is such that the nutrient availability to plants is spread over time.
12. **Biofertilizer**- Biofertilizers are non-pathogenic active cultures of microorganism which benefit the plants by providing nitrogen or phsophorus or rapid mineralisation of organic material.
13. **Liquid fertilizer**- A term used for fertilizers in suspension or solution and for liquefied ammonia. The principal materials used in making liquid fertilizer are ammonia, ammonium nitrate, urea, phosphoric acid, and potassium chloride.

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14. **Suspension fertilizers** - A two-phase fertilizer in which solid particles are maintained in suspension in the aqueous phase.

15. **Soil conditioner-** Material added to soils, the main function of which is to improve their physical and/or chemical properties and/or their biological activity.

16. **Liming material**- An inorganic soil conditioner containing one or both of the elements calcium and magnesium, generally in the form of an oxide, hydroxide, or carbonate, principally intended to maintain or raise the soil pH.

17. **Filler material** – A substance added to fertilizer materials to provide bulk, prevent caking or serve some purpose other than providing essential plant nutrients.

18. **Powder-** A solid substance in the form of very fine particles. Powder is also referred to as "non-granular fertilizer" and is sometimes defined as a fertilizer containing fine particles, usually with upper limit such as 3 mm but no lower limit.

5.2 Fertilizer use in Bangladesh

Inorganic fertilizers have been introduced into this country during early 1950's as a supplemental source of plant nutrients. But their use started increasing steadily only from the mid 1960's along with the introduction and expansion of modern varieties accompanied by the development of irrigation facilities. The increasing trend of fertilizer use, particularly urea-N, still continues (Appendix-1). Until 1980, three primary major plant nutrients (N, P & K) along with one secondary nutrient (Ca) were supplied from fertilizer to the soil. The importance of S and Zn for rice culture in particular was recognized during early 1980's. Gypsum, zinc sulphate and zinc oxy-sulphate were then introduced to supply these nutrients. Very recently, the deficiencies of Mg, B and Mo have been reported for some soils and crops. Of the total nutrients used in the country, nitrogen alone constitutes about 80 percent, which may lead to nutrient imbalance in the soil-plant systems. If this trend of fertilizer use continues along with intensive cultivation of high yielding crop varieties, the productivity of soils is likely to be seriously affected. To avert this potential danger, the limiting nutrients must be identified and the soils should be enriched with the addition of these nutrients in properly balanced fertilization programmes. Prior to 1990, only TSP was used by our farmers as a source of P because it was the only P containing fertilizer available in the market at that time. After 1990, SSP as an alternative source of P was introduced in our fertilizer market and its availability was increasing with time. But granular SSP was banned for sometime in the country due to adulteration. SSP in the name of TSP was largely sold to farmers by dealers that hampered farmers' interest and thus production level. DAP, another source of P was made available and the farmers started to use this fertilizer. Since these materials vary in their P content, variable amounts of these materials would be required to meet a specific P fertilizer recommendation. As SSP contains S and DAP contains N in addition to P, there is a need to adjust for S and N fertilizer application if either SSP or DAP is used as a source of P instead of TSP. A list of commonly used fertilizer is given in Appendix-2.

5.3 Fertilizer use in other countries

Use of chemical fertilizers in the Asian region has increased considerably in recent years (Appendix-3). Application of fertilizers per unit area is the maximum in Korea followed by China and the minimum in Mayanmar. During the past few years, total fertilizer use in Bangladesh has increased significantly. A further increase in fertilizer use needs to occur in those countries where more production has to be realized from the limited areas of land.

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6. FERTILIZER MANAGEMENT

6.1 Balanced use of fertilizers

We are increasingly forced to meet up growing food needs from increases in yield from existing or even from shrinking land areas. In this process, we are moving away from the traditional and rather static "soil dependent" agriculture to dynamic "fertilizer dependent" agriculture.

In a fertilizer dependent agriculture "balanced fertilization" is cornerstone of all activities. Balanced use of fertilizer should aim at:

- increasing crop yields
- increasing crop quality
- increasing farm income
- correction of inherent soil nutrient deficiencies
- improving soil fertility
- avoiding damage to the environment
- restoring fertility and productivity of land

In principle, balanced fertilization (regardless of fertilizer sources) is indispensable to avoid crop yield decline on cultivated land and to supplement nutrient loss from the soil ecosystem. Balanced fertilization ensures high productivity in accordance with nutrient demand by individual crops and for individual nutrient elements without causing harm to the environment.

Unbalanced fertilizer use at the expense of inherent soil fertility practices represent 'soil mining' as against 'soil building' that results from balanced fertilization. Only 'soil building' leads to a sustainable land use and crop production system.

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6.2 Efficient use of fertilizers

Fertilizer plays a crucial role in yield increase and is responsible for about 50 percent of the total production.

Nutrient use efficiency

Farmers are mostly concerned with the gross margin and the marginal benefit-cost ratio from investment in fertilizers and soil conservation measures. The most relevant measure of nutrient use efficiency is, therefore, the partial factor productivity from investment in applied nutrients. The partial factor productivity from applied nutrients (PFP) is the ratio of grain yield to the quantity of applied nutrients.

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Agronomic Efficiency (AE)

It represents the marginal benefit from investment in nutrient inputs**.**
The formula for AE is:

where, AE = GY_{NA}-GY N_O/N_R

AE = Agronomic efficiency

GY_{NA} = Grain yield (kg/ha) with addition of nutrient

GY_{No} = Grain yield (kg/ha) without addition of nutrient

N_R = Rate of added nutrient (kg/ha)

Recovery efficiency (RE)

Crop management practices in general and nutrient management practices in particular have the greatest impact on the RE from applied nutrients. For example, competition from weeds, poor control of water, plant disease or insect damage can reduce the uptake of applied nutrients. Thus, improved crop management per se, including use of the best adapted variety, helps to maximize the RE from applied nutrients.

Physiological efficiency (PE)

Physiological efficiency (PE) represents the ability of a plant to transform a given amount of acquired nutrient into economic yield. For cereals, economic yield is grain yield. There are significant differences in PEs among genotypes. Most of the variations are associated with differences in harvest index (HI) which is the ratio of grain yield to total plant biomass, for example, traditional rice varieties typically have an HI of 0.33 while modern high yielding semidwarf rice varieties (MV) have an HI of 0.5. Therefore, with an equivalent quantity of N uptake and total biomass production MV will have greater PE than the traditional variety.

Deep placement of N fertilizers

Deep-placed N is in a chemically available form (NH_4^+-N) in the proximity of the placement site. Uptake of deep-placed N can be elongated by placing the USG at lower depths and away from the plant. With USG, recovery of deep placed N in wetland rice is greater than the N recovery from surface applied and/or incorporated ordinary urea. Fertilizer recovery in the wetland rice plant tops is found significantly higher for deep placed as USG/UMG/^{15}N (50-60%) than for split – applied Urea ^{15}N (25-34%). About 40% nitrogen can be saved by using USG or UMG in rice and 20% in vegetable and fruit crops (viz. cabbage, cauliflower, tomato, potato and papya).

Urea Super Granules (USG) and Urea Mega Granules (UMG) are used to increase nitrogen use efficiency. Urea Super Granules (USG) are small (0.9 g) and Urea Mega Granules (UMG) are large sized (1.8 or 2.7 g) pellets made of ordinary prilled/granular urea by compressing. The amount of USG or UMG should be adjusted to the recommended dose of N for different crops and soils. The granules (USG/UMG) need to be placed after 5-7 days of transplanting of rice at 8-10 cm soil depth at the centre of every four hills between rows 1 and 2, between rows 3 and 4, and so on. Recommended numbers of USG ball for each vegetable plant should be applied at 6-10 cm apart from base of plant and into 6-8 cm deep as ring method at 10-15 days after transplanting.

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The main benefit of USG/UMG placement is that N losses through NH_3 volatilization, nitrification, denitrification and runoff are significantly minimized. Deep-placed N as USG/UMG is less subject to algal immobilization and uptake by aquatic weeds than broadcast and/or incorporated urea. These two factors contribute to the improved nitrogen use efficiency (NUE=60%) of USG/UMG in the wetland rice.

6.3 Rationale

Fertilizers behave differently in the soil-plant system. Some fertilizers, namely those of P, S and Zn have considerable residual effect and only a fraction of the total applied amount is recovered by a single crop. In such cases, application of fertilizer in full dose at each crop is not economical. In view of this, as well as major variations in soil characteristics, the following points should be considered for making cropping pattern based fertilizer recommendations.

i) Moderate yield goal has been assumed to be 75-85% of the high yield goal. In rainfed condition, the yield reduction would be 15% for rice & jute, 20% for potato & sugarcane, and 35% reduction for wheat, tobacco, oilseed, vegetables and spices.

ii) As a source of nitrogenous fertilizer, urea is unstable and leaves very little or no residue in soil. Each crop, therefore, needs to be supplied with this fertilizer as per requirement. In a crop following a good green manuring crop, N dose may be reduced by 25-30 kg/ha provided 12-15 tons green biomass of GM (dhaincha) is incorporated, and in case of stover incorporation of grain legume, dose of N may be reduced by 8-10 kg/ha.

iii) Availability of phosphorus is low at both low and high soil pH. Phosphorus recovery is usually very low (15-25%) and has considerable residual effect. Thus, the P rates for the second and third crops would be reduced by 40-50% for rice & jute, and by 30-40% for maize, vegetables, spices & pulses under moderately acid to slightly alkaline soil conditions. Such reduction would be 30-40% for rice & jute and no reduction for maize, vegetables, spices & pulses in strongly acid and calcareous soils.

iv) Availability of potassium is high in soil with high K-bearing minerals. Generally, K supplying ability of light textured, terrace and piedmont soils are low. Again, the K requirement of crops, particularly rice, tuber crops, jute, sugarcane, many fruits, vegetables and spices are high. On the other hand, crop residues are not being recycled in the field. Consequently, most intensive cropped areas show a large K mining (130-165 kg K/ha/yr) which is about 80% of total nutrient mining (175-215 kg of N+P+K+S /ha/yr). Recently National Agricultural Policy (NAP) highlighted this large K mining and its possible measures. The following principles/rationales need to be followed in making potassium recommendation in crops and cropping patterns.

- Response of crops to added K fertilizer is not clear in many cases, potassium application should be considered as maintenance dose even at optimum level of soil K.

- Potassium application can be reduced by 30-40% in the subsequent crops after potato, maize, tobacco, sugarcane, vegetables and spices when high doses of K fertilizer are used.

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- The K does may be reduced by 20-40% in subsequent crops if 2-4 ton of crop residues/rice straw per hectare are properly recycled with soils.

- Since release of K is high in kharif season due to high temperature, potassium application may be reduced by about 10-15% of recommended dose.

v) Sulphur availability is high under upland culture and low under wetland rice culture. The element has substantial residual effect. Crops grown under wetland condition should receive full dose of S. Upland crops (except oil seed, maize, vegetables and spices) following wet condition (kharif-II season) may receive 50% of the recommended S dose. For oil seed, maize, vegetables and spices crops the full dose of S application is recommended.

vi) Zinc availability is low in calcareous and wetland rice soils. Zinc should be applied to both rabi and kharif crops when grown in calcareous soils (AEZs 10, 11, 12, & 13). For 2 or 3 rice-rice cropping patterns, full amount of Zn needs to be applied to the 1st crop and 50% rate to the 2nd or 3rd crop. In non-rice- rice cropping pattern (except maize, potato, vegetables and spices) Zn should be supplied to rice crop only. For growing maize, potato, vegetables and spices, Zn needs to be added to a full rate.

vii) In the cropping patterns where rabi is a fallow period, full recommended dose of nutrients should be applied to the kharif-I crop.

viii) If organic sources (cowdung, FYM, poultry manure, pressmud, compost etc.) of nutrients except GM/grain legumes are used in the cultivation of field crops, certain quantity of fertilizer nutrients can be reduced from the recommended rates as per Appendix-6.

ix) If bio-fertilizer (inoculum) is used in a leguminous crop, nitrogen fertilizer is not needed. Inoculant requirement for different lagume crops is given in Appendix-7.

x) If two full layers of azolla are incorporated in rice field particularly in Boro, about 25-30 kg N/ha may be supplemented.

xi) For rainfed condition, all the recommended fertilizer nutrients (i.e. N, P, K, S, etc.) should be reduced by 25-30% in comparison with irrigated condition

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6.4 Time and methods of fertilizer application

Fertilizer efficiency depends to a great extent, on the time and methods of application. This is particularly important in case of nitrogen fertilizers which are highly water soluble and are easily lost from soil in various ways. In certain situations, as much as 70% of the applied nitrogen may be lost from the soil, and thus, become unavailable to the crop. Fertilizers are now a very costly input. Therefore, efforts should be made to increase the efficiency of applied fertilizers.

In applying fertilizers, the following general principles should be kept in mind.

i) Fertilizers should not be applied too close to seeds, young roots and stems of herbaceous plants.

ii) Fertilizers should not fall on leaves when they are young and wet.

iii) Fertilizers should be mixed with the soil thoroughly as much as possible.

iv) Urea should not be applied on high standing water.

v) Zinc and phosphate fertilizers should not be applied together.

vi) Organic manure/ fertilizers should be applied at least 15-20 days before sowing/planting and mixed thoroughly with the soil.

vii) Rice should be transplanted immediately after incorporation of green manure

viii) Foliar spray is good for trace elements, particularly for horticultural crops.

For efficient use of fertilizers, an appropriate method of fertilizer application is very important. There are three methods of fertilizer application: broadcast, localized application and foliar spray. Broadcast method is most commonly used in field crops and the localized method is widely followed in horticultural crops.

In order to increase the efficiency of fertilizers, the following general guidelines need to be followed.

i) During rabi season, if there is no facility for irrigation, the full dose of urea should be applied and mixed with the soil during final land preparation.

ii) If irrigation facility exists during rabi season, urea should be applied in three splits: basal (during final land preparation), rapid vegetative growth stage, and 5-7 days before primordial initiation.

iii) In case of rice (except B. Aman rice), urea should be applied in three equal splits. The first instalment of urea for transplanted rice culture may be applied at final land preparation or immediately after seedling establishment and incorporated with soil through last puddling in a saturated field or first weeding. In case of broadcast rice culture, the first instalment should be added before initiation of tillering and incorporated with soil along with weeding. The second instalment of urea should be top dressed at rapid tillering and incorporated with soil along with the second weeding and the third instalment should be applied 5-7 days before panicle initiation in saturated soil or soil with minimum standing water.

iv) For vegetables, 2-3 split applications of urea should be adjusted with the growth periods of the crop. For short duration crops the full dose of urea may be applied during final land preparation.

v) For most spices, urea application may be made in 2-3 splits.

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vi) The benefit of top-dressed urea application is best realized when the fertilizer is applied in late afternoon to the moist or just saturated soil and mixed thoroughly with the soil except at panicle initiation stage.

vii) Phosphate fertilizer should be applied during ploughing, 1-2 days prior to final land preparation and zinc fertilizer should be applied during final land preparation.

viii) The full doses of potassium and sulphur fertilizers should be applied during final land preparation. However, in coarse-textured soils, the potassium fertilizer may be applied in two splits: the first one-half at final land preparation and the second one-half at rapid tillering stage with the second application of urea.

ix) For tobacco and onion crops, K_2SO_4 instead of KCl(MOP) should be applied.

x) Sulphur and zinc fertilizers may be top dressed if necessary, especially if the recommended doses of these fertilizers have not been applied basally. Yellowing of younger leaves of the plants in spite of timely urea application indicates sulphur deficiency. In such cases, the recommended dose of sulphur fertilizer should be top dressed in full as soon as possible. Whitening of the younger leaves (progressively from the base of the leaf to the tip) followed by tiny brown spots points is the symptom of zinc deficiency. The full dose of zinc fertilizer should be top dressed immediately.

xi) The method of application of fertilizer to an intercrop is the same as practiced for the particular sole crop.

Foliar application of fertilizers

Plants may absorb fertilizers directly when applied to their foliage as aqueous solution. This method can be used for any plant nutrient, but commonly employed in case of micronutrients which are required in relatively small amount. Foliar sprays should not be done during scorched sunlight. On cloudy days, any time of the day is appropriate. Each species of plant has a maximum limit of tolerance of concentration of a particular dissolved fertilizer. The most commonly used chemical forms in which different nutrients are applied in the foliar method and the ranges of concentration are given below:

Nutrient	Chemical forms	Concentration(g//100 litre)
Iron	Ferrous sulphate	250-350
Manganese	Manganese sulphate	250-500
Zinc	Zinc sulphate	250-600
Copper	Copper sulphate	250-600
Boron	Solubor	250-600
Molybdenum	Sodium molybdate	30-60

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6.5 Fertilizer management in multiple cropping

Multiple cropping is an important component to minimize risks and increase agricultural production. The philosophy of multiple cropping is maximizing crop production/unit areas of land with minimum soil deterioration and this philosophy is based on the modern concepts of soil management. As an approach towards planning of resources, existing as well as new ones, multiple cropping is a time dimension land use effort within a calendar year through repeated cropping. It is labour intensive highly productive cropping practices can lead not only to increased production and greater income but also to a more equitable distribution of income and an opportunity for diversified agriculture. Small land holders especially with limited land but high available labour resources can be benefited from multiple cropping.

For intercrops, fertilizer recommendations are made on the basis of the intercrop plant population in the field. Usually half or one-third of the recommended rates of fertilizers for a particular crop is recommended depending upon the number of rows, i.e. plant population of the crop. Fertilizer recommendations for different mixed and intercropping systems are given in the chapter 10.4 of this guide.

6.6 Fertilizer management in no-tillage/minimum tillage system

No tillage may be defined as the introduction of seed into unploughed soil in narrow slots, trenches or bands of sufficient width and depth for seed coverage and soil contact. Minimum tillage refers to the introduction of seeds into least disturbed soil usually in furrows or with one to two ploughings followed by one disking/laddering.

In Bangladesh no-tillage/minimum tillage is generally practiced in potato and maize cultivation in low lying areas after recession of flood water, wheat cultivation just after T. Aman rice harvest, by relaying grass pea, mustard and wheat in standing T. Aman rice field. Soil moisture is one of the major constraints for crop production in Bangladesh in the winter. Minimum tillage can help achieve this objective since it conserves soil moisture. It has also the potential to reduce the turn around time between rice and winter crop and may thus allow planting in optimum time.

Nutrient requirement of crops grown under minimum/no-tillage is not greatly changed as compared to conventional tillage. However, there are changes and most of these arise from the fact that there is less disturbance of the soil. The extent of change is determined by the degree of reduction in tillage, amount of residues returned to the soil surface and length of the tillage system.

Mineralization, denitrification and leaching of N change with tillage. Nitrogen mineralization rate tends to be lower because the soil is not as greatly disturbed and the organic residues remain on the surface where decomposition is slower. Hence, there is usually less nitrate in the soil in unfertilized soil under no-tillage as compared to similar conventionally tilled soil. Since, nitrogen in the systems tends to be less available under no tillage. It has been found that delaying the application of nitrogen under no-tillage helps avoid early losses due to denitrification and leaching.

Phosphorus requirement of crops grown under minimum/no-tillage is very similar to conventional tillage. Minimum tillage affects soil temperature, soil water content and fertilizer placement. Under mulched surface, the mean temperature is lower than a soil that has been disturbed by conventional tillage. When this mean temperature is below the critical temperature for seedling growth and development, the uptake of P will be inhibited. The amount of P uptake depends mainly on the diffusion

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of this element. Diffusion of P increases with the soil water content. Therefore, it would be expected that under no-tillage, phosphorus diffusion rate would be higher than in the conventional.

Potassium fertilization in no-tillage systems is not a problem with most soils and climatic conditions. On soils where continuous no-tillage system is practiced, samples for soil tests should be taken from the upper 0-10 cm soil depth to better represent the fertility status. With this adjustment recommendation for no-tillage corn (as with phosphorus) is similar to those made for conventional tillage.

6.7 Fertilizer management in problem soils

A problem soil is one in which certain unfavorable conditions restrict the growth of plants making crop production difficult and sometimes impossible. Special management practices need to be done for producing crops economically in such soils. In Bangladesh there are different types of problem soils occurring in various agro-ecological zones. A brief account of each of them is furnished below.

Saline soils

Saline soils have a high content of soluble salts. The EC value of saturated extract is more than 4 ds/m at 25^0C, ESP value is less than 15 and the pH value is below 8.5. It is also called white alkali soils. The soluble salts are mostly chlorides and sulphates of Na, Ca and Mg.

Soil salinity develops in various ways: continuous accumulation of salts from tidal floodings, upstream withdrawal of the Ganges water, cyclone and tidal charges, shrimp cultivation and irrigation of saline groundwater. The saline soils exist in an area of about 1 million ha which occur in the districts of Khulna, Satkhira, Bagerhat, Borguna, Pirojpur, Cox's Bazar, Patuakhali, Bhola, Noakhali, Feni, Laxmipur and Chittagong. The salinity starts to increase from the month of December and reached its peak in March/April.

The crop production constraints include reduction in absorption of water and nutrients due to high osmotic pressure, poor soil structure and damage of young plants. Shallow rooted crops are more affected. Fertility status of this soil including organic matter content is generally low. Among the nutrients, the N, P and Zn contents of soil are especially low. Both cropping intensity and crop yield are low, cropping intensity being an average 60% and rice yield (mainly local Aman) 1.5 t/ha only. Barley and cotton have considerable salt tolerance. Due to temporal and spatial variation in soil salinity, location specific crop planning is rather important. Wheat, maize, potato, mustard, linseed and groundnut can be grown in low saline areas.

Acid sulphate soils

The potential of the acid sulphate soils for crop production is severely limited by some environmental factors like saline tidal flooding, tidal bores and probability of cyclonic storms. The soil pH is generally below 3.5. Its extent is about 0.23 million ha, occuring in Chittagong, Cox's Bazar, Khulna and Satkhira. In Chittagong, this soil is known as Kosh Soils.

These soils can be utilized for mangrove forest, salt production and shrimp culture. If protection from tidal flooding through embankment is possible, T. Aman rice can be cultivated. Deficiency of P and toxicity of Fe and Al are major constraints for crop cultivation.

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Peat soils

These soils occur in about 0.13 million ha of land. They occur extensively in the Gopalganj – Khulna Bils, locally in some haors of the eastern Surma – Kushiyara Floodplain in Sylhet Basin and on the adjoining Northern and Eastern Piedmant plains. Organic matter may occupy up to 40 cm depth. Dark brown muck is the common constituent of the soil. Under wet conditions, these soils are near neutral in reaction and become acidic when drained. Some peat soils might be suitable for boro rice cultivation. The limitations for crop production include deep flooding, wetness throughout the year, low bearing capacity and poor availability of K, Zn and Cu.

Waterlogged soils

Inundation of land for a long period is harmful even for wetland crops, especially if the standing water is stagnant. Waterlogging restricts aeration of the soil creating an oxygen-free environment in the root zone. Under such conditions, activities of most of the useful microorganisms is hampered and the availability of S and Zn is reduced. Wetland rice is likely to respond to S and Zn fertilizers even in soils that are rich in these nutrients. Continuous inundation even in wetland rice culture should be avoided. The soil should be allowed to dry between two wetland rice crops. Waterlogging promotes the formation of gases like methane, H_2S etc. which pollute the atmosphere.

6.8 Fertilizer management in hill farming

Soil erosion is a serious problem in the slopy lands of the hilly areas. Erosion removes the fertile top soil and makes the root zone of the soil narrow. This creates the problem of nutrient deficiency, and water stress during the rain free periods. Clean cultivation should not be practiced in such soils especially when the slope is more than 45 degrees. Jhum cultivation should be discouraged. Erosion can be reduced by special practices like terracing, contour planting and stubble mulching. Steep slopes should better be left under perennial plants and permanent cover.

6.9 Liming

Soil acidity is largely controlled by ion exchange and other adsorptive reactions. The inorganic substances that cause acidity are the aluminosilicate clays, hydrous oxides of iron and aluminium, exchangeable aluminium, soluble salts and carbon dioxide. Al-ions on the surface of the clay can also generate acidity (H^+).

The organic substances have humus which contains reactive carboxylic and phenolic groups that behave as weak acid. Soil acidity develops during the decompositions of organic matter in peat soils. Uses of high rate of nitrogenous fertilizer causes soil acidity. Nitrification contributes to soil acidification through the production of hydrogen ions.

Consideration of soil acidity or alkalinity is important because these conditions exert strong influences on root development as well as activity of soil bacteria and fungi, symbiotic nitrogen fixation by legumes and availability of a wide range of nutrients including phosphorous, iron, zinc, boron, manganese and copper.

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Lime (calcium carbonate, calcium oxide, calcium hydroxide, magnesium carbonate, dolomite etc.) reduces soil acidity by reacting primarily with the reserve acidity that results from hydrogen and aluminium ions adsorbed on colloidal surfaces. The following illustration demonstrates the reaction between lime and soil acidity.

$$CaCO_3 + H_20 \longrightarrow Ca^{++} + HCO_3^- + OH^-$$

(Lime)

$$H^+ + OH^- \longrightarrow H_20$$

Calcium carbonate is dissolved in water forming a calcium ion, a bicarbonate ion and a hydroxyl ion. The Ca- ion is adsorbed by the soil colloids, replacing two hydrogen ions (H+) from the reserve acidity on the colloid. The hydrogen ions react with hydroxyl ions (OH^-) from the calcium carbonate and bicarbonate producing water plus some carbon dioxide. Subsequently the amount of reserve acidity (which is in equilibrium with the soil pH) is reduced and soil pH is increased.

Except some Gangetic alluvial soils, all soils of Bangladesh are acidic to neutral in nature. The pH range for these acidic soils is around 4 to 7. Only when free acids are present, pH value may go below 4.

The amount of liming necessary to neutralize reserve acidity of a soil is determined depending on the soil pH, organic matter and clay contents

The most common liming agents are calcitic limestone (calcium carbonate) and dolomite. Dolomite is a mixture of calcium carbonate and magnesium carbonate and can also serve as a good source of magnesium. The rate of dolomite application would be 3-5, 2-3 and 1-2 t/ha for soils having pH 3.5-4.5, 4.6-5.5 and 5.6-6.5, respectively

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7. SOIL ORGANIC MATTER MANAGEMENT

7.1 Significance of soil organic matter

Soil organic matter comes from plant and animal remains. It influences the physical, chemical and biological properties of soils. It improves soil physical conditions viz soil structure, water holding capacity, aeration and protect soil erosion. It's a storehouse of plant nutrients, chiefly N,P & S. It serves as a food and energy for beneficial organisms viz N_2 fixing bacteria (e.g *Rhizobium, Azobtobacter*), earthworms.

7.2 Organic matter status in Bangladesh soils

A good soil should have at least 2.5% organic matter, but in Bangladesh most of the soils have less than 1.5%, and some soils even less than 1% organic matter. The organic matter content of top soils under high land and medium high land situation has been declining over time. It is believed that the declining productivity of this country's soils is the result of depletion of organic matter due to increasing cropping intensity, higher rates of decomposition of organic matter under the prevailing hot and humid climate, use of lesser quantities of organic manure, little or no use of green manure practices etc. The highest depletion of organic matter has been reported in soils of Meghna River Floodplains (35%). followed by Madhupur Tract (29%), Brahmaputra Floodplains (21%), Old Himalayan Piedmont Plains (18%), Gangetic Floodplains (15%).

7.3 Management of soil organic matter

There is no doubt that the soil organic matter is constantly undergoing changes and needs to be replenished continuously to maintain soil productivity. The major sources of soil organic matter include animal manure, crop residues, household and farmyard wastes, municipal sewage sludge, industrial refuse, green manuring practices and other organic wastes of various kinds.

A large variety of organic wastes are available in the country that can be used as potential manure to improve soil organic matter. These are household wastes (human excreta, non-edible vegetables, food and fruit parts, after-meal wastes etc.), farmyard wastes (animal dung and urine, feed/fodder refuse, harvested crop residues, poultry excreta etc.), agro-industrial wastes (sugarcane trash, oil cakes, bagasse, molasses, bone meal, blood meal, fish meal, rice husk, brans, saw dust etc.), sewage sludge, and farm wastes (crop residues, weeds, dead animals, water hyacinth etc.). Organic wastes like kitchen wastes, non-edible parts of vegetables, food and fruit parts, slaughter house wastes, dead animals etc. are generally thrown away or dumped into ditches/ponds/canals to fill up and not used as organic fertilizer. The important organic wastes/practices which have great potential in increasing soil organic matter and thus crop productivity are discussed below:

Crops residues

Leftover parts of various crops after harvest are called crop residues. Substantial quantities of crop residues are produced in the country every year. But little or no care is given for its use. In most cases, crop residues are burnt or removed away to clean the land causing huge loss of this potential resource. Crop residues of all kinds including roots, straw & stalks and vegetable tops are valuable as a source of organic matter and plant nutrients. Crop residues can be recycled either by composting or by mulching or by direct incorporation into the soil.

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Animal manure

It includes the excreta (dung and urine) of the domestic animals. Stubbles used as bedding of animals also become part of the manure. In Bangladesh, cowdung is the most important animal manure, although a big portion of the cowdung produced in the country is used as fuel.

Fresh animal manure should not be applied to standing crops, because the heat and CO_2 generated during vigorous decomposition is harmful for the young roots. Substantial quantities of animal manure produced in Bangladesh are lost due to careless handling. Nutrient content of preserved manure is also reduced due to same reason. Animal manure should be stored in pits preferably under a roof. The urine of cattle is rich in nitrogen and should be preserved with the dung. The manure in the pit should be kept moist in order to reduce the volatilization of nitrogen in gaseous forms. The rotting of animal manure, when kept in pits, is complete in 3-4 months. Microbial inoculants, if available, may be used to reduce the rotting time.

Compost

The organic fertilizer that is produced by decomposing different waste materials of plant and animal origin is called compost. Ingredients that are used to make compost include dead leaves, straw, weeds, water hyacinth, household wastes like non-edible food, fruit and vegetable parts, after-meal wastes, municipal garbage, saw dust, wastes of leather factory, sugar mill bagasse, rice husk etc. Municipal and leather wastes should be treated to make them free from heavy metals and other toxic substances. The materials should be placed in layers, one above another. Each layer may be 25-30 cm thick. Heaps should preferably be 1.5 - 2.0 meter wide and not more than 1.5 meter in height. In order to promote microbial activities, thin (4-5 cm) layers of soil or fresh cowdung should be placed in between the layers of materials in the heap. Top of the heap should also be covered with soil. The heap should be kept moist, by spraying water at regular intervals. After 1.5 - 2 months the layers should be reversed in a new heap to allow uniform decomposition. Depending on the condition of the weather and the type of raw materials used, preparation of compost takes 4 - 6 months. High temperature and high humidity favour rapid decomposition. Addition of small quantities of urea and triple superphosphate hastens the rotting of raw materials like straw, sugarcane trash, rice husk etc. which decomposes very slowly. Microbial accelerator, if available, may also be used for rapid decomposition.

Vermicomposting : It is the process of using earthworms to convert organic wastes such as manure or household refuse to valuable compost. The earthworm inhabits organic matter lying on soil surface; eat fallen leaves and other non-decomposed litter. It has also been found to be especially efficient in breaking down the toughest organic wastes like sugarcane trash.

Concentrated organic manure

These are oil cake, slaughter house wastes, fish meal, guano and poultry manure which are rich in NPK. Being popular as animal feed, oil cakes are costly and should be applied to high value crops only. Cakes should be decomposed in water for 10-12 days if applied near the base of young seedlings.

Green manure

Green manure refers to crops that are grown and ploughed down at the appropriate stage of growth. In some countries, farmers collect fresh leaves from the forests and apply to the soil. This is called green leaf manure. Green manure adds substantial quantities of organic matter and nitrogen to soils.

Any herbaceous plant may be used for green manuring, but plants of the family leguminosae are preferred because of the added advantage of getting fixed nitrogen. The common GM plants include dhaincha *(Sesbania aculeata),* African dhaincha *(S. rostrata),* sunhemp (*Crotalaria juncea*), cowpea,

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grasspea, soybean, mungbean, blackgram etc. The crops should be ploughed down when the plants are of 50-55 days old. Rhizobial inoculation would be useful to obtain higher biomass in a given period over uninoculated legumes. Dhaincha needs to be incorporated into soil within a week before transplanting of T. Aman rice. A green manure crop may add 10 - 15 ton of biomass (fresh weight) and 60-90 kg of N per hectare to the soil.

Azolla

Dual culture of *Azolla* in wetland rice is a unique technology to produce green biomass for incorporation as green manure. It can be practiced in Boro and T.Aman rice cropping. Inoculation of 0.5-1.0 kg/sq.m Azolla inoculum after 7-10 days of transplanting is recommended which may produce 10 ton/ha biomass within 2-3 weeks. Azolla produced and incorporated twice in this way may produce rice yield equivalent to the yield obtained by applying 80 kg N/ha.

Blue-green algae

Blue green algae can add upto 3-8 ton organic carbon in a cropping season. Many other microorganisms (*Azotobacter, Azospirillum, Rhizobium, Bacillus, Pseudomonas,* etc.) that produce growth hormones help in better seed germination and root development, thus contributing considerably to organic matter status in soil.

7.4 Organic farming

Organic farming is defined as the farming without the use of chemical fertilizers or synthetic pesticides. It is a system of agriculture that encourages healthy soils and crops through such practices as nutrient recycling of organic matter (such as compost and crop residues), crop rotations, proper tillage and the avoidance of synthetic fertilizers and pesticides. Its economic viability depends on the higher price that customers will pay as yields from organic farming are generally lower than from conventional farming.

Practices under organic farming

In organic farming, various farming practices are followed with the crops to harness organic matter, nutrients and water essential for crop growth. Genetically synergist species are normally selected. Some of such practices are alley cropping, mixed/intercropping, cover crop, green manuring and mulching.

Materials used in organic farming

Organic fertilizers : Farmyard manure, compost, green manure, biological nitrogen fixating (BNF) plants and other products of organic origin are used as organic fertilizers instead of chemicals in organic farming. Moreover, decomposed dungs (1-2 weeks) plus certain broad-leaf plant leaves are also used as top dressing to vegetables.

Organic insecticides: Recipes of leaf, stem, shoot, root or bark of certain species are used as insecticides in organic farming.

Organic wastes: Organic wastes are products, by-products or refuse of organic origin (plant/animal/aquatics) produced through rural/urban production, consumption or processing having conventionally little or no human-use value and considered as garbage or waste materials. These are normally obtained in the food chain of human, animals, plant and aquatics and finally used in the soil.

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7.5 Use of biofertilizer

Biofertilizers are microbial inoculants consisting of living and active strains of specific bacteria, algae, fungi, alone or in combination, used for application to seed, soil or composting areas with the objective of increasing crop productivity. They help in the biological nitrogen fixation, solubilization of insoluble phosphate, decomposition of organic matter and stimulating plant growth.

Rhizobial biofertilizer

Rhizobial biofertilizer/inoculants are made with bacterial strains, reported to fix atmospheric N_2 in symbiosis with legumes. They are the members of five bacterial genera: *Rhizobium, Mesorhizobium, Bradyrhizobium, Sinorhizobium* and *Azorhizobium*. The beneficial effect of these organisms in increasing yield of leguminous crops (lentil, chickpea, cowpea, mungbean, blackgram, pigeonpea, grasspea, pea, groundnut and soybean) results from the activity of its root nodules which fix atmospheric nitrogen making available for the plants.

Procedure for application of rhizobial biofertilizers

a. Take an amount of seed in a container/bowl.

b. Add sugarcane molasses (2-3% for large seeds viz. groundnut, soybean etc. and 3-5% for small seeds viz. lentil, mungbean, etc.) and mix with seeds to make them sticky.

c. Add peat based inoculant (2-3% for large seeds and 3-5% for small seeds) to sticky seeds.

d. Mix seeds with inoculum until they are coated and appear uniformly black.

e. Dry seeds under shade on a paper. Do not dry in direct sunlight.

f. There should be a minimum 24-hour gap between seed treatment with fungicide and biofertilizer application.

g. Use double quantity of biofertilizer in case of pesticide treated seeds.

h. Sow the inoculated seeds and cover the seeds with soil immediately.

Azolla biofertilizer

Azolla is a floating fern, fixes atmospheric N_2 in symbiosis with *Anabaena azollae*. Azolla can be used both as a green manure and as a dual crop after transplanting depending on water availability.

As a dual crop, inoculate azolla in standing water @ 3-4 t/ha 1-2 weeks after transplanting of rice. After 3-4 weeks, water needs to be drained out and azolla can be buried in the soil where it is growing with a weeder or other suitable implement. Repeated incorporation of azolla is needed. Azolla can be grown more than once for the same rice crop to get an additional benefit.

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8. INTEGRATED PLANT NUTRITION SYSTEM (IPNS)

8.1 Concept

The basic concept of Integrated Plant Nutrition System (IPNS) is 'the management of all available plant nutrient sources, organic and inorganic, to provide optimum and sustainable crop production conditions within the prevailing farming system'.

Therefore, in IPNS an appropriate combination of mineral fertilizers, organic manures, crop residues, compost, N-fixing crops and bio-fertilizers is used according to the local ecological conditions, land use systems and the individual farmer's social and economical conditions.

When you advise the farmer on how best to follow an IPNS approach, it is important to look at *the cropping pattern* rather than a single crop, and *the whole farming system* rather than the individual field. Before establishing the need for mineral fertilizers, it should be estimated what is available and what is the plan nutrient value of FYM, crop residues, compost and other organic materials. Only then should you try to complement the shortfall in required plant nutrients with inorganic fertilizers. When you have prepared a balanced fertilizer plan for the farmer, remember again to discuss proper crop rotation, encourage crop diversification, and the use of the green manure like dhaincha and the use of BNF, where suitable.

Many cropping patterns are practiced in Bangladesh depending on the agro ecological conditions and availability of irrigation facilities. These cropping patterns are essentially rice-based, since rice is grown in most areas at least once in the pattern.

8.2 Elements of IPNS

The following elements of IPNS can be considered.

Natural resources: Soil supply, water supply (irrigation), deposition by rain or dust and natural BNF.

Organic nutrient sources

- Crop residues are important for recycling of a good percentage of nutrients taken up by the plant, which are gradually returned to the soil. Besides, it will also apply organic matter to the soil.
- Green manure increases the working capital of nutrients by nutrient mobilization (by taking up nutrients from the soil and making them available to the following crop through decomposition, N-fixation or by saving nutrients from leaching). Organic material will be added to the soil as incorporation of green manure.
- Nitrogen fixation by bacteria and other microorganisms through biofertilizers is an important source for non-inorganic nitrogen supply to the cropping system.
- Organic matter management Preservation and application of organic matter from manures (e.g. cowdung, poultry manure, FYM) or compost (e.g. water hyacinth). Important criteria of organic matter sources are the dry matter content, total and quick-acting nitrogen, C/N ratio, etc.
- Organic waste management Other organic wastes can also be considered for supplying plant nutrients and/or organic matter, e.g. pressmud from sugarcane, oilcakes, etc. Night soil or (treated) sewage sludge is already in use in some countries, although care should be taken in terms of hygiene and crop and soil quality (polluting agents).

Mineral resources: Inorganic fertilizers.

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8.3 IPNS acivitias under Soil Fertility and Fertilizer Management Project (SFFP)

IPNS is the main strategy through which SFFP tries to achieve its objective of "Food grain production increased through maintenance and improvement of soil fertility". The following SFFP field activities implemented through DAE in the upazilas are in this respect most relevant: Cropping Pattern based balanced fertilizer demonstrations; Biological Nitrogen Fixation (BNF) demonstrations; Green Manure demonstrations introducing dhaincha as green manure in cropping systems; Preservation and use of FYM. In Block Demonstrations it is tried to transfer IPNS to groups of farmers for increased and sustainable yields in cropping systems using above mentioned accepted and transferable technologies. In Trainings and Workshops to DAE staff and farmers emphasis is laid on interaction and integration of plant nutrients from different sources in cropping systems for increased and sustainable yields. The respective Research Institutes (BARI, BRRI, BJRI, BINA, BSRI, and BAU) are investigating the most suitable, efficient and environmentally and socially acceptable methods of Integrated Nutrient Management.

8.4 Computation of IPNS

Under farmers' condition the following approach in relation to IPNS is suggested.

First an assessment should be made of the possible plant nutrient and organic matter sources available within the farming system. Then it should be established what the approximate plant nutrient contribution of these sources is (nutrient content, nutrient release). Some assessment of the soil fertility status in the field can be made, using the information available with the farmer from his own field plus possible soil sample for additional information. It can be helpful to have an idea about the soil nutrient supply capacity by knowing the natural or biological yield of a certain crop (yield without fertilization).

Together with the farmer a realistic yield target should be set, taking into account his resources, possible risks etc. Then the question remains how best to complement the shortfall between targeted plant nutrient demand by the crop and the approximate organic plant nutrient supply, with inorganic fertilizer. Finally, the correct doses of different types of fertilizers (organic + inorganic) should be properly applied at the correct time and place to optimize fertilizer use efficiency.

In other words: How best to manage the plant nutrient sources in the prevailing farming system to reach the intended yield goal taking into account the farmers resources.

Computations

In Table 4 you can apply your knowledge about Integrated Plant Nutrition System (IPNS) in calculating the actual need of fertilizers. Information in Table 4 shows how to calculate the season-wise need for external mineral fertilizer, considering other sources of nutrients as well.

First, establish the total need of plant nutrients from the AEZ table or from your own calculation.

Second, estimate how much is supplied from other sources like FYM, cowdung, poultry manure, brown/green manure, legumes, crop residues etc.

From Appandix-6 (Nutrient supply from organic materials, green manure and crop residues to succeeding crop) you can find an average figure for the nutrient (N,P,K,S etc.) values (kg/ha) of different organic materials of per 1000 kg material.

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Finally, you subtract the values of organic source from the total need and you will get the actual need for mineral/external fertilizer in terms of plant nutrients.

Therefore, you can calculate the amount of fertilizer material (Urea, DAP, TSP, SSP, MOP, Gypsum, Zinc sulphate etc.) in kg. per ha. You will make the same calculations for all three seasons.

An example of calculations of IPNS for Potato-T.aus-T.aman rice cropping pattern is given in Table 5.

Table 4. Annual Fertilizer Plan for cropping pattern following the AEZ cropping pattern based recommendations and IPNS principles

Step 1. Cropping pattern and nutrient recommendation from AEZ tables (nutrient in kg/ha.)

AEZ : Land type : Rainfed/Irrigated:

Season	Crop	Yield level (kg/ha)	N	P	K	S	Mg	Zn	B
Rabi									
Kharif-1									
Kharif-2									

Step 1a. Fertilizer plan for rabi crop :

	N	P	K	S	Mg	Zn	B
a) Recommended dose (kg/ha)							
b) Supply from organic material : cowdung, FYM, GM etc. (see Appendix-6)							
c) To add from fertilizer (a-b)							

Step 1b. Fertilizer plan for kharif-I crop :

	N	P	K	S	Mg	Zn	B
a) Recommended dose (kg/ha)							
b) Supply from organic material : cowdung, FYM, GM etc. (see Appendix-6)							
c) To add from fertilizer (a-b)							

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Step 1c. Fertilizer plan for kharif-II crop :

	N	P	K	S	Mg	Zn	B
a) Recommended dose (kg/ha)							
b) Supply from organic material : cowdung, FYM, GM etc. (see Appendix-6)							
c) To add from fertilizer (a-b)							

Step 2. Nutrients converted to fertilizer materials in kg/ha

Material	Urea	DAP	SSP	TSP	MoP	Gypsum	Mg fert.	Zinc fert.	B fert.
Rabi									
Kharif-1									
Kharif-2									

Table 5. Computation of IPNS based fertilizer requirement for Potato–T.aus–T.aman rice cropping pattern

Step 1. Nutrient recommendation in kg/ha (from AEZ tables) for Potato-T.aus-T.aman rice Cropping pattern

AEZ : 19 Land type : Medium High Land Rainfed/Irrigated: Irrigated

Season	Crop	Yield level (t/ha)	N	P	K	S	Mg	Zn	B
Rabi	Potato	25.00	96	16	80	8	-	1	0.5
Kharif-1	T.aus	3.50	50	4	10	5	-	-	
Kharif-2	T.aman	4.00	60	4	18	5	-	1	

Step 1a. Fertilizer plan for potato :

			N	P	K	S	Mg	Zn	B
a) Recommended dose (kg/ha)			96	16	80	8	-	1	0.5
b) Supply from organic material	Cowdung	5 t/ha	23	8	25	-	-	-	
c) To add from fertilizer (a-b)			73	8	55	8	-	1	0.5

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Step 1b. Fertilizer plan for T. Aus rice

			N	P	K	S	Mg	Zn	B
a) Recommended dose (kg/ha)			50	4	10	5	-	-	-
b) Supply from organic material	None								
c) To add from fertilizer (a-b)			50	4	10	5	-	-	-

Step 1c. Fertilizer plan for T.Aman rice

			N	P	K	S	Mg	Zn	B
a) Recommended dose (kg/ha)			60	4	18	5	-	1	-
b) Supply from organic material	None								
c) To add from fertilizer (a-b)			60	4	18	5	-	1	-

Step 2. Nutrients converted into fertilizer materials in kg/ha

Material / Crop	Urea	DAP	SSP	TSP	MOP	Gypsum	Mg Sulphate	Zinc Sulphate	Boric acid
Potato	158			40	110	44		3.0	
T.aus	110			20	20	28		-	
T.aman	130			20	36	28		3.0	

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9. QUALITY CONTROL OF FERTILIZERS

9.1 Fertilizer Control Order, 1999 and Fertilizer Control Order, 2006 (Proposed)

The Government of the People's Republic of Bangladesh (SRO No. 375-Law/99) has promulgated 'The Fertilizer Control Order, 1999' and 'The Control of Essential Commodities Act, 1956' by a Gazette Notification (Reg. No. DA-1 dated 27.12.99) to enforce quality control of fertilizers. According to this order, MOA advises the Government regarding procurement, import, sale and marketing of fertilizers and to evaluate the new fertilizers/fertilizer materials/organic fertilizers/plant growth regulators/ hormones etc. through laboratory testing and field experimentation/evaluation.

A revised fertilizer control order, 2006 is waiting for promulgation and gazettee notification.

Regular monitoring of fertilizer marketing and fertilizer inspection is essential to ensure the availability of standard and quality fertilizers in the market to protect the interest of the farmers, the honest manufacturers and traders and to check fraudulent practices. The Government can appoint Fertilizer Inspector as per order of Fertilizer (Control) Act 1999/2006 (proposed). The role, TORs, duties and responsibilities of Fertilizer Inspector have been explained in Fertilizer Inspection Manual, 2003.

9.2 TORs and Responsibilities of Fertilizer Inspector

The Government may appoint any officers (TAO/AAO/AEOs/similar ranking officers) of the Department of Agriculture Extension (DAE) as Fertilizer Inspectors. TORs of a Fertilizer Inspector are given below:

- Inspector can visit/enter any fertilizer factory, fertilizer godown, carrying transport and distribution centre to collect relevant papers and fertilizer samples for inspection.
- He shall report to the higher authority of any fault regarding fertilizer production and marketing.
- He can initiate any proceedings/case against any defaulters.
- He can ask explanation against any person involved in fertilizer storage and sale for any sorts of adulteration.
- He can collect any fertilizer sample as per standard procedure for sending to the Govt approved laboratories for analysis.
- The Govt approved laboratories shall complete the analysis of fertilizer sample or fertilizer material within 21 (twenty one) days of receipt of samples sent by Fertilizer Inspector and the lab authority will send the results of fertilizer analysis within the stipulated period to concerned Fertilizer Inspector, Deputy Director (Agril. Extension) and concerned person/manufacturer/organization.
- The Inspector can issue order to stop selling of any fertilizer if found/doubted adulterated.

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10. FERTILIZER RECOMMENDATION FOR CROPS AND CROPPING PATTERNS

10.1 Fertilizer recommendation for individual crops

Soil analysis, if properly done and rightly interpreted in relation to crop response, can be used as an effective tool for location specific and yield goal basis fertilizer recommendation. The range of soil test values and their interpretations for fertilizer recommendation given in the 1997 guide needs to be updated. In this updated guide, soil test values are interpreted into 6 categories based on C.L along with their corresponding expected crop yield response for making more realistic fertilizer recommendation (Table 6 & Fig. 8). Only for high and moderate yield goals, fertilizer recommendations are suggested upto an optimum level of soil test values for macronutrients. And for micronutrients recommendations are suggested up to medium level of soil test values. No fertilizer recommendation is suggested when soil test values fall within high and very high categories. Moderate yield goal has been assumed to be around 75-85% of the high yield goal. Examples of making location specific fertilizer recommendation for crops (e.g. wheat) and cropping patterns on the basis of soil test, yield goal and rationales are given in Appendix-9 and 10, respectively.

This part of fertilizer recommendation guide provides guidelines for making location specific and yield goal based fertilizer recommendation for field crops, horticultural crops and plantation crops. These guidelines should be followed when specific soil analytical data and their interpretation are available.

Table 6. Interpretation of soil test values in relation to critical limits (CL) and expected crop response (an example for phosphorus)

Soil test value interpretation	Percent of C.L	Expected crop response
Very low	< 75	Very definite
Low	75.1-150	Definite
Medium	150.1-225	Likely/probable
Optimum	225.1-300	Less likely
High	300.1-375	Unlikely
Very high	> 375	Very unlikely

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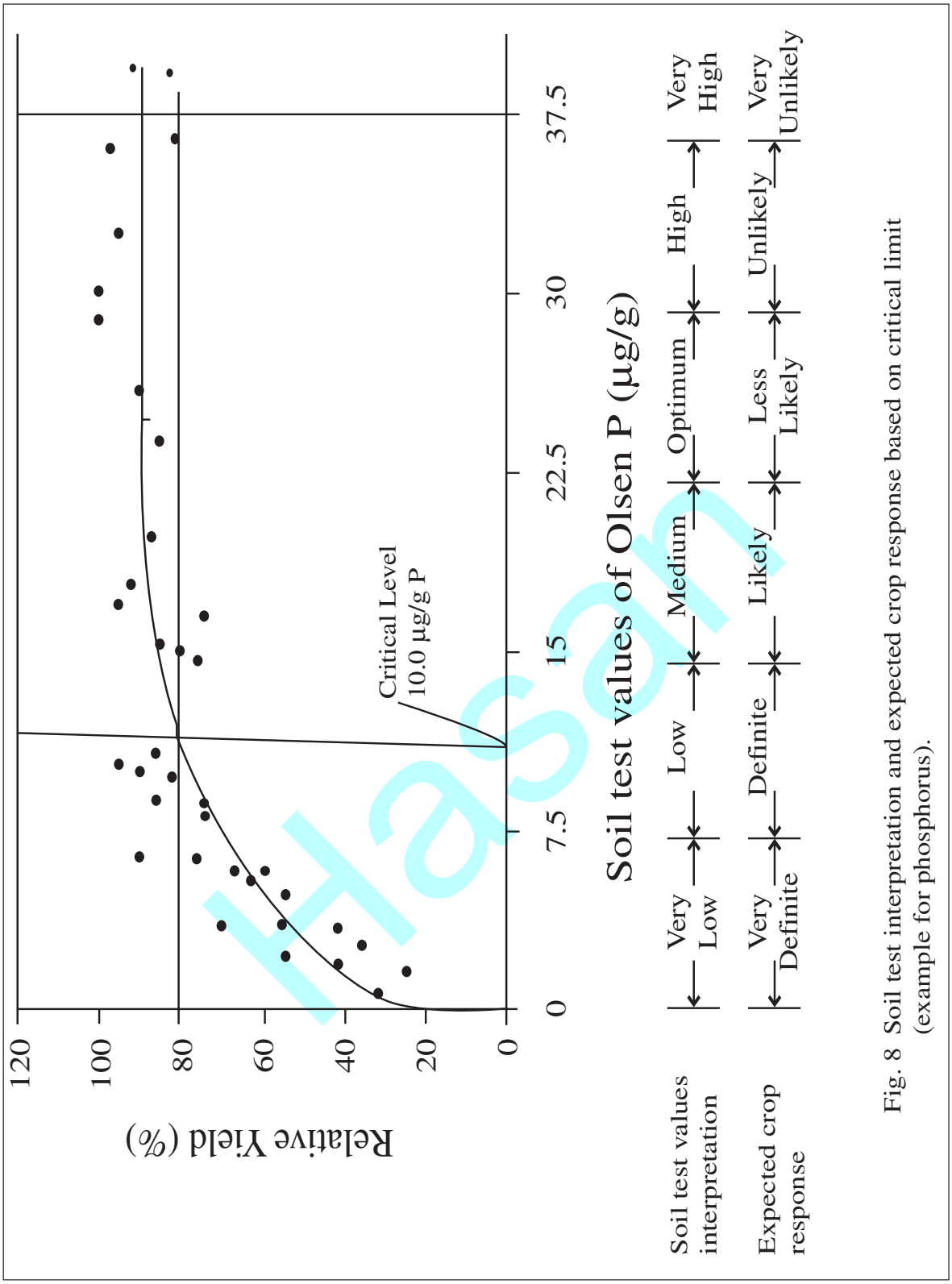

Fig. 8 Soil test interpretation and expected crop response based on critical limit (example for phosphorus).

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SPECIFIC FERTILIZER RECOMMENDATION FOR CROPS

CEREAL CROPS

RICE

(Boro Season)

(Var: BRRI dhan 29, Binadhan-6 and Hybrid rice)

Table 1. High Yield Goal (7.5 ± 0.75 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0-56	0-10	0-33	0-6	-
Medium	57-112	11-20	34-66	7-12	0.0-1.3
Low	113-168	21-30	67-99	13-18	1.4-2.6
Very low	168-224	31-40	100-132	19-24	2.7-3.9

Table 2. Moderate Yield Goal (6.0 ± 0.60 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0-40	0-7	0-23	0-4	-
Medium	41-80	8-14	24-46	5-8	0.0-1.0
Low	81-120	15-21	47-69	9-12	1.1-2.0
Very low	121-160	22-28	70-92	13-16	2.1-3.0

Notes: For All Yield Goals

a) All phosphorus, potassium, sulphur, and zinc fertilizer should be applied as broadcast and incorporated with soils prior to transplanting.

b) Nitrogen should be applied in splits. For very low to low soil test values, N should be applied in three equal splits. The first one third should be applied either at final land preparation or immediately after seedling establishment and the second onethird at rapid tillering stage. Both of these installments should be applied as broadcast and incorporated with soil following by weeding. The third installment should be applied as broadcast at 5—7 days before panicle initiation. For medium and optimum soil test values, N should be applied in 2 installments as top-dressing, one at active tillering stage followed by weeding and the other at 5—7 days before panicle initiation stage just as broadcast.

c) For hybrid rice, apply N into 4 equal Splits (1/4 as basal, ¼ at active tillering stage, ¼ at maximum tillering stage and final ¼ at booting stage) for low to very low soil test values and for medium soil test values into 3 equal spilts (1/3 at 10—15 DAT, 1/3 at maximum tillering stage and final 1/3 as 5—7 DBPI). For light textured soils apply Potassium into 2 splits (1/3rd at basal and 2/3rd at tillering stage).

d) For use of urea super granules (USG)/urea mega Granules (UMG) as a source of nitrogen, the method of application as described in page 39 should be properly followed.

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RICE

(Boro Season)

(Var: BR3, BR8, BR9, BR14, BR16, BR17, BR18, BR19 and Binadhan-4)

Table 1. High Yield Goal (6.0 ± 0.60 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0-45	0-7	0-25	0-4	-
Medium	46-90	8-14	26-50	5-8	0.0-1.0
Low	91-135	15-21	51-75	9-12	1.1-2.0
Very low	136-180	22-28	76-100	13-16	2.1-3.0

Table 2. Moderate Yield Goal (4.8 ± 0.48 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0-32	0-5	0-18	0-3	-
Medium	33-64	6-10	19-36	4-6	0.0-0.7
Low	65-96	11-15	37-54	7-9	0.8-1.4
Very low	97-128	16-20	55-72	10-12	1.5-2.1

Notes: For All Yield Goals

a) All phosphorus, potassium, sulphur, and zinc fertilizer should be applied as broadcast and incorporated with soils prior to transplanting.

b) Nitrogen should be applied in three splits. For very low to low soil test values, N should be applied in three equal splits. The first one third should be applied either at final land preparation or immediately after seedling establishment and the second one third at rapid tillering stage. Both of these installments should be applied as broadcast and incorporated with soil followed by weeding. The third installment should be applied as broadcast at 5—7 days before panicle initiation. For medium and optimum soil test values, N should be applied in 2 installments as top-dressing, one at rapid tillering stage followed by weeding and the other at 5—7 days before panicle initiation stage as broadcast.

c) For use of urea super granules (USG)/ urea mega Granules (UMG) as a source of nitrogen, the method of application as described in page 39 should be properly followed.

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RICE

(Boro Season)

(Var: BR1, BR2, BR7, BR15, BRRI dhan 28, BRRI dhan 35 and BRRI dhan 36)

Table 1. High Yield Goal (5.0 ± 0.50 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0-35	0-5	0-20	0-5	-
Medium	36-70	6-10	21-40	6-10	0.0-1.0
Low	71-105	11-15	41-60	11-15	1.1-1.5
Very low	106-140	16-20	61-80	16-20	1.6-2.0

Table 2. Moderate Yield Goal (4.0 ± 0.40 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0-25	0-4	0-14	0-3	-
Medium	26-50	5-8	15-28	4-6	0.0-0.5
Low	51-75	9-12	29-42	7-9	0.6-1.0
Very low	76-100	13-16	43-56	10-12	1.1-1.5

Notes: For All Yield Goals

a) All phosphorus, potassium, sulphur, and zinc fertilizer should be applied as broadcast and incorporated with soils prior to transplanting.

b) Nitrogen should be applied in splits. For very low to low soil test values, N should be applied in three equal splits. The first one third should be applied either at final land preparation or immediately after seedling establishment and the second one third at rapid tillering stage. Both of these installments should be applied as broadcast and incorporated with soil followed by weeding. The third installment should be applied as broadcast at 5—7 days before panicle initiation. For medium and optimum soil test values, N should be applied in 2 installments as top-dressing, one at rapid tillering stage followed by weeding and the other at 5—7 days before panicle initiation stage just as broadcast.

c) For use of urea super granules (USG)/ urea mega granules (UMG) as a source of nitrogen, the method of application as described in page 39 should be properly followed.

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RICE

(Boro Season)

(Var: LIV under transplanted culture)

Table 1. High Yield Goal (3.5 ± 0.35 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0-23	0-4	0-14	0-3	-
Medium	24-46	5-8	15-28	4-6	0.0-0.6
Low	47-69	9-12	29-42	7-9	0.7-1.2
Very low	70-92	13-16	43-56	10-12	1.3-2.0

Table 2. Moderate Yield Goal (2.8 ± 0.28 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0-16	0-3	0-10	0-2	-
Medium	17-32	4-6	11-20	3-4	0.0-0.5
Low	33-48	7-9	21-30	5-6	0.6-1.0
Very low	49-64	10-12	31-40	7-8	1.1-1.5

Notes: For All Yield Goals

c) All phosphorus, potassium, sulphur, and zinc fertilizer should be applied as broadcast and incorporated with soils prior to transplanting.

d) Nitrogen should be applied in splits. For very low to low soil test values, N should be applied in three equal splits. The first one third should be applied either at final land preparation or immediately after seedling establishment and the second one third at rapid tillering stage. Both of these installments should be applied as broadcast and incorporated with soil followed by weeding. The third installment should be applied as broadcast at 5—7 days before panicle initiation. For medium and optimum soil test values, N should be applied in 2 installments as top-dressing, one at rapid tillering stage followed by weeding and the other at 5—7 days before panicle initiation stage just as broadcast.

c) For use of urea super granules (USG)/ urea mega granules (UMG) as a source of nitrogen, the method of application as described in page 39 should be properly followed.

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RICE

(T. Aus Season)

(Var: BR1, BR2, BR3, BR7, BR8, BR9, BR14, BR16, BR26, BRRI dhan-27, and Iratom-24)

Table 1. High Yield Goal (4.0 ± 0.4 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0-25	0-4	0-15	0-3	-
Medium	26-50	5-8	16-30	4-6	0.0-1.0
Low	51-75	9-12	31-45	7-9	1.1-1.5
Very low	76-100	13-16	46-60	10-12	1.6-2.0

Table 2. Moderate Yield Goal (3.2. ± 0.32 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0-18	0-3	0-11	0-2	-
Medium	19-36	4-6	12-22	3-4	0.0-0.5
Low	37-54	7-9	23-33	5-6	0.6-1.0
Very low	55-72	10-12	34-44	7-8	1.1-1.5

Notes: For All Yield Goals

a) All phosphorus, potassium, sulphur, and zinc fertilizer should be applied as broadcast and incorporated with soils prior to transplanting.

b) Nitrogen should be applied in splits. For very low to low soil test values, N should be applied in three equal splits. The first one third should be applied either at final land preparation or immediately after seedling establishment and the second one third at rapid tillering stage. Both of these installments should be applied as broadcast and incorporated with soil followed by weeding. The third installment should be applied as broadcast at 5—7 days before panicle initiation. For medium and optimum soil test values, N should be applied in 2 installments as top-dressing, one at rapid tillering stage followed by weeding and the other at 5—7 days before panicle initiation stage just as broadcast.

c) For use of urea super granules (USG)/ urea mega granules (UMG) as a source of nitrogen, the method of application as described in page 39 should be properly followed.

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RICE
(T.Aus Season)

(Var: BR6, BR20, BR21 and BR24)

Table 1. High Yield Goal (3.5 ± 0.35 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0-17	0-4	0-11	0-3	-
Medium	18-34	5-8	12-22	4-6	0.0-1.0
Low	35-51	9-12	23-33	7-9	1.1-1.5
Very low	52-68	13-16	34-44	10-12	1.6-2.0

Table 2. Moderate Yield Goal (2.8. ± 0.28 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0-12	0-3	0-8	0-2	-
Medium	13-24	4-6	9-16	3-4	0.0-0.5
Low	25-36	7-9	17-24	5-6	0.6-1.0
Very low	37-48	10-12	25-32	7-8	1.1-1.5

Notes: For All Yield Goals

a) All phosphorus, potassium, sulphur, and zinc fertilizer should be applied as broadcast and incorporated with soils prior to transplanting.

b) Nitrogen should be applied in splits. For very low to low soil test values, N should be applied in three equal splits. The first onethird should be applied either at final land preparation or immediately after seedling establishment and the second one third at rapid tillering stage. Both of these installments should be applied as broadcast and incorporated with soil followed by weeding. The third installment should be applied as broadcast at 5—7 days before panicle initiation. For medium and optimum soil test values, N should be applied in 2 installments as top-dressing, one at rapid tillering stage followed by weeding and the other at 5—7 days before panicle initiation stage just as broadcast.

c) For use of urea super granules (USG)/ urea mega granules (UMG) as a source of nitrogen, the method of application as described in page 39 should be properly followed.

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RICE

(Aus season)

(Var: LIV under direct seeded culture)

Table 1. Average Yield Goal (2.5 ± 0.25/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0-10	0-3	0-8	0-2	-
Medium	11-20	4-6	9-16	3-4	0.0-0.5
Low	21-30	7-9	17-24	5-6	0.6-1.0
Very low	31-40	10-12	25-32	7-8	1.1-1.5

Notes:

a) All phosphorus, potassium, sulphur, and zinc fertilizer should be applied as broadcast and incorporated with soils prior to planting.

b) Nitrogen fertilizer should be applied as broadcast in two equal installments, the 1st one at the tiller initiation stage and should be incorporated with soil during harrowing/1st weeding and the 2nd one at 5—7 days before panicle initiation.

c) For use of urea super granules (USG)/ urea mega granules (UMG) as a source of nitrogen, the method of application as described in page 39 should be properly followed.

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RICE
(T.Aman Season)

(Var: BR4, BR10, BR11, BR22, BR23, BRRIdhan 30, BRRIdhan 31, BRRIdhan 32 and Binadhan-4)

Table 1. High Yield Goal (5.0 ± 0.5 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0-30	0-5	0-17	0-4	-
Medium	31-60	6-10	18-34	5-8	0.0-1.0
Low	61-90	11-15	35-51	9-12	1.1-1.5
Very low	91-120	16-20	52-72	13-16	1.6-2.0

Table 2. Moderate Yield Goal (4.0. ± 0.4 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0-22	0-4	0-13	0-3	-
Medium	23-44	5-8	14-26	4-6	0.0-0.5
Low	45-66	9-12	27-39	7-9	0.6-1.0
Very low	67-84	13-16	40-52	10-12	1.1-1.5

Notes: For All Yield Goals

a) All phosphorus, potassium, sulphur, and zinc fertilizer should be applied as broadcast and incorporated with soils prior to transplanting.

b) Nitrogen should be applied in splits. For very low to low soil test values, N should be applied in three equal splits. The first onethird should be applied either at final land preparation or immediately after seedling establishment and the second one third at rapid tillering stage. Both of these installments should be applied as broadcast and incorporated with soil followed by weeding. The third installment should be applied as broadcast at 5—7 days before panicle initiation. For medium and optimum soil test values, N should be applied in 2 installments as top-dressing, one at rapid tillering stage followed by weeding and the other at 5—7 days before panicle initiation stage just as broadcast.

c) For use of urea super granules (USG)/ urea mega granules (UMG) as a source of nitrogen, the method of application as described in page 39 should be properly followed.

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RICE

(T.Aman Season)

(Var: BR25, BRRIdhan 33, BRRIdhan 39, and Binashail)

Table 1. High Yield Goal (4.0± 0.4 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0-20	0-4	0-11	0-3	-
Medium	21-40	5-8	12-22	4-6	0.0-1
Low	41-60	9-12	23-33	7-9	0.1-1.5
Very low	61-80	13-16	34-44	10-12	1.6-2.0

Table 2. Moderate Yield Goal (3.2 ± 0.32/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0-14	0-3	0-8	0-2	-
Medium	15-28	4-6	9-16	3-4	0.0-0.5
Low	29-42	7-9	17-24	5-6	0.6-1.0
Very low	43-56	10-12	25-32	7-8	1.1-1.5

Notes: For All Yield Goals

a) All phosphorus, potassium, sulphur, and zinc fertilizer should be applied as broadcast and incorporated with soils prior to transplanting.

b) Nitrogen should be applied in splits. For very low to low soil test values, N should be applied in three equal splits. The first onethird should be applied either at final land preparation or immediately after seedling establishment and the second onethird at rapid tillering stage. Both of these installments should be applied as broadcast and incorporated with soil followed by weeding. The third installment should be applied as broadcast at 5—7 days before panicle initiation. For medium and optimum soil test values, N should be applied in 2 installments as top-dressing, one at rapid tillering stage followed by weeding and the other at 5—7 days before panicle initiation stage just as broadcast.

c) For use of urea super granules (USG)/ urea mega granules (UMG) as a source of nitrogen, the method of application as described in page 39 should be properly followed.

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RICE
(T.Aman Season)

(Var: BR 5, BRRIdhan 34, BRRIdhan 37, and BRRIdhan 38)

Table 1. Average Yield Goal (3.0 ± 0.3/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0-15	0-2	0-8	0-3	-
Medium	16-30	3-4	9-16	4-6	0.0-0.5
Low	31-45	5-6	17-24	7-9	0.6-1.0
Very low	46-60	7-8	25-32	10-12	1.1-1.5

Notes:

a) All phosphorus, potassium, sulphur, and zinc fertilizer should be applied as broadcast and incorporated with soils prior to transplanting.

b) Nitrogen should be applied in splits. For very low to low soil test values, N should be applied in three equal splits. The first one third should be applied either at final land preparation or immediately after seedling establishment and the second one third at rapid tillering stage. Both of these installments should be applied as broadcast and incorporated with soil followed by weeding. The third installment should be applied as broadcast at 5—7 days before panicle initiation. For medium and optimum soil test values, N should be applied in 2 installments as top-dressing, one at rapid tillering stage followed by weeding and the other at 5—7 days before panicle initiation stage just as broadcast.

c) For use of urea super granules (USG)/ urea mega granules (UMG) as a source of nitrogen, the method of application as described in page 39 should be properly followed.

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RICE
(T.Aman Season)

(Var: LIV under transplant culture)

Table 1. Average Yield Goal (3.0 ± 0.3/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0-15	0-3	0-11	0-3	-
Medium	16-30	4-6	12-22	4-6	0.0-0.5
Low	31-45	7-9	23-33	7-9	0.6-1.0
Very low	46-60	10-12	34-44	10-12	1.1-1.5

Notes:

a) All phosphorus, potassium, sulphur, and zinc fertilizer should be applied as broadcast and incorporated with soils prior to transplanting.

b) Nitrogen should be applied in splits. For very low to low soil test values, N should be applied in three equal splits. The first onethird should be applied either at final land preparation or immediately after seedling establishment and the second one third at rapid tillering stage. Both of these installments should be applied as broadcast and incorporated with soil followed by weeding. The third installment should be applied as broadcast at 5—7 days before panicle initiation. For medium and optimum soil test values, N should be applied in 2 installments as top-dressing, one at rapid tillering stage followed by weeding and the other at 5—7 days before panicle initiation stage just as broadcast.

c) For use of urea super granules (USG)/ urea mega granules (UMG) as a source of nitrogen, the method of application as described in page 39 should be properly followed.

Fertilizer recommendation for seed-bed

Generally fertilizer is not required to apply in the seed-bed if it is prepared in optimum or sub-optimum fertile soil. For low or nonfertile soil, cowdung or farmyard manure @ 2 kg/m^2 can be applied. If seedlings become yellow, urea should be top dressed @ 7 g/m^2 after 2 weeks of germination. If seedlings still remain yellowish even after urea application, then it can be considered as sulphur deficiency symptom. In those cases, gypsum should be applied @ 10 g/m^2 as to top dress. In the winter season, seedlings of boro rice may become reddish or yellowish due to cold injury which may be confused as tungro disease.

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WHEAT

(Irrigated)

(Var: Kanchan, Gourab, Protiva, Sourav, Agrahani and Shatabdi)

Table 1: High Yield Goal (Yield: 4.5 ± 0.45 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Mg	Zn	B
Optimum	0—40	0—10	0—30	0—5	—	—	—
Medium	41—80	11—20	31—60	6—10	0—3	0.0—1.3	0.0—0.3
Low	81—120	21—30	61—90	11—15	4—6	1.4—2.6	0.4—0.6
Very low	121—160	31—40	91—120	16—20	7—12	2.7—4.0	0.7—0.9

Table 2: Moderate Yield Goal (Yield: 3.5 ± 0.35 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Mg	Zn	B
Optimum	0—30	0—8	0—25	0—4	—	—	—
Medium	31—60	9—16	26—50	5—8	0.0—2.5	0.0—1.0	0.0—0.2
Low	61—90	17—24	51—75	9—12	2.6—5.0	1.1—2.0	0.3—0.4
Very low	91—120	25—32	76—100	13—16	9.1—7.5	2.1—3.0	0.4—0.6

Notes: For All Yield Goals

a) One-third of the nitrogen and all the phosphorus, potassium, sulphur, zinc and boron should be applied as broadcast and incorporated prior to sowing.

b) Remaining two thirds of nitrogen should be applied in equal amounts at 20-25 DAS and 50-55 DAS as top dressing followed by irrigation.

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WHEAT
(Rainfed)

(Var: Kanchan, Akhbar, Gourab, Protiva, Sourav and Shatabdi)

Table 1: Average Yield Goal (Yield: 2.5 ± 0.25 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Mg	Zn	B
Optimum	0—15	0—5	0—12	0—2.5	—	—	—
Medium	16—30	6—10	13—24	2.6—5.0	—	—	—
Low	31—45	11—15	25—36	5.1—7.5	0.0—3.0	0.0—1.0	1.4—2.6
Very low	46—60	16—20	37—48	7.6—10.0	3.1—6.0	1.1—2.0	2.7—4.0

Notes:

a) All fertilizers should be applied as basal prior to sowing.

b) Application of 2-4 t/ha cowdung/organic manure is recommended for soils having low to very low fertility status. The dose of N, P, K & S may be reduced based on quantity of CD/OM to be applied and as per Appendix-6.

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MAIZE

Var: Hybrid Maize

(BARI hybrid Bhutta-1, BARI hybrid Bhutta-2, BARI hybrid Bhutta-3 and other hybrids)

Table 1: High Yield Goal (Yield: 8.0 ± 0.8 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Mg	Zn	B
Optimum	0—65	0—18	0—37	0—12	0—5	—	—
Medium	66—130	19—36	38—74	13—24	6—10	0.0—2.0	0.0—0.7
Low	131—195	37—54	75—111	25—36	11—15	2.1—4.0	0.71—1.4
Very low	196—260	55—72	112—148	37—48	16—20	4.1—6.0	1.41—2

Notes:

a) One-third of nitrogen, and all phosphorus, potasium, sulphur, magnesium, zinc and boron should be applied as broadcast. This should be applied prior to sowing.

b) Remaining nitrogen should applied in two equal installments as top dressing at 8-10 leaf stage (30-35 DAS) and at taselling stage (50-60 DAS) for rabi season followed by irrigation.

c) For kharif season, remaining N should be applied in 2 equal installments as top dressing at 8-10 leaf stage (20-25 DAS) and at taselling stage (45-50 DAS).

d) Application of 3-5 t/ha cowdung/organic manure is recommended for soils having low to very low fertility status. The dose of N, P, K & S may be reduced based on quantity of OM/CD to be applied and as per Appendix-6.

e) The above doses of nutrients are applicable to maize grown in rabi season. Such doses may be reduced by 30% when the crop is grown in kharif season.

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MAIZE

(Var: BARI Bhutta-5 and BARI Bhutta-6)

Table 1: High Yield Goal (Yield: 6.0 ± 0.6 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Mg	Zn	B
Optimum	0—50	0—16	0—32	0—10	—	—	—
Medium	51—100	17—32	33—64	11—20	0—4	0.0—1.4	0.0—0.7
Low	101—150	33—48	65—96	21—30	5—8	1.5—2.8	0.71—1.41
Very low	151—200	49—64	97—128	31—40	9—12	2.9—4.0	1.41—2.0

Table 2: Moderate Yield Goal (Yield: 5.0 ± 0.5 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Mg	Zn	B
Optimum	0—35	0—12	0—25	0—7	—	—	—
Medium	36—70	13—24	26—50	8—14	0—3	0—1.0	0—0.5
Low	71—105	25—36	51—75	15—21	4—6	1.1—2.0	0.51—1.0
Very low	106—140	37—48	76—100	22—28	7—9	2.1—3.0	1.11—1.5

Notes: For all Yield Goals

a) Onethird of nitrogen, and all phosphorus, potasium, sulphur, magnesium, zinc and boron should be applied as broadcast. This should be applied just prior to planting.

b) Remaining nitrogen should be applied in two equal installments as top dressing at 8-10 leaf stage (30-35 DAS) and at taselling stage (50-60 DAS).

c) For kharif season, remaining nitrogen should be applied in two equal installments as top dressing at 8-10 leaf stage (20-25 DAS) and at taselling stage (40-50 DAS).

d) Application of 2-3 t/ha cowdung/organic manure is recommended for soils having low to very low fertility. The dose of N, P, K & S may be reduced based on quantity of CD/OM to be applied and as per Appendix-6.

e) The above doses of nutrients are applicable to maize grown in rabi season. Such doses may be reduced by 30% when the crop is grown in kharif season.

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MAIZE

(Var: Shuvra, Mohor, Barnali and Khoibhutta)

Table 1: High Yield Goal (Yield: 5.5 ± 0.5 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Mg	Zn	B
Optimum	0—40	0—20	0—25	0—10	—	—	—
Medium	41—80	21—30	26—50	11—20	0—3	0.0—1.4	0.0—1.5
Low	81—120	31—40	51—75	21—30	4—6	1.5—2.8	1.6—3.0
Very low	121—160	41—50	76—100	31—40	7—9	2.9—4.2	3.1—4.5

Table 2: Moderate Yield Goal (Yield: 4.5 ± 0.5 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Mg	Zn	B
Optimum	0—30	0—14	0—18	0—7	—	—	—
Medium	31—60	15—21	19—36	8—14	0—3	0.0—1.0	0.0—1.0
Low	61—90	22—28	37—54	15—21	4—6	1.1—2.0	1.1—1.5
Very low	91—120	29—36	55—72	22—28	7—8	2.1—3.0	1.6—3.0

Notes: For All Yield Goals

a) Onethird of nitrogen, and all phosphorus, potasium, sulphur, magnesium, zinc and boron should be applied as broadcast. This should be applied just prior to planting.

b) Remaining nitrogen should applied in two equal installments as top dressing at 8-10 leaf stage (30-35 DAS) and at taselling stage (50-60 DAS).

c) For kharif season, remaining nitrogen should be applied in two equal installments as top dressing at 8-10 leaf stage (20-25 DAS) and at taselling stage (40-50 DAS).

d) Application of 2-3 t/ha cowdung/organic manure is recommended for soils having fertility status low to very low. The dose of N, P, K & S may be reduced based on quantity of CD/OM to be applied and as per Appendix-6.

e) The above doses of nutrients are applicable to maize grown in rabi season. Such doses may be reduced by 30% when the crop is grown in kharif season.

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BARLEY

(Var: BARI Barley-1 and BARI Barley-2)

Table 1: High Yield Goal (Yield: 3.0 ± 0.3 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0—20	0—7	0—17	0—3	—
Medium	21—40	8—14	18—34	4—6	0.0—1.0
Low	41—60	15—21	35—51	7—9	1.1—2.0
Very low	61—80	22—28	52—68	10—12	2.1—3.0

Table 2: Moderate Yield Goal (Yield: 2.5 ± 0.25 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0—15	0—5	0—15	0—2	—
Medium	16—30	6—10	16—30	3—4	0.0—0.7
Low	31—45	11—15	31—45	5—6	0.71—1.40
Very low	46—60	16—20	46—60	7—8	1.41—2.0

Notes: For All Yield Goals

a) Half nitrogen and all phosphorus, potassium, sulphur and zinc should be applied and incorporated during find land preparation.

b) Remaining nitrogen should be applied as broadcast at 30-35 DAS and 55-60 DAS followed by irrigation.

c) In case of rainfed, all fertilizers should be applied as basal prior to sowing.

Hasan

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CHEENA
(Var: Tushar)

Table 1: High Yield Goal (Yield: 2.5 ± 0.25 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0—20	0—7	0—15	0—3	—
Medium	21—40	8—14	16—30	4—6	0.0—0.7
Low	41—60	15—21	31—45	7—9	0.8—1.4
Very low	61—80	22—28	46—60	10—12	1.5—2.1

Table 2: Moderate Yield Goal (Yield: 2.0 ± 0.2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0—15	0—5	0—11	0—2	—
Medium	16—30	6—10	12—22	3—4	0.0—0.5
Low	31—45	11—15	23—33	5—6	0.6—1.0
Very low	46—60	16—20	34—44	7—8	1.1—1.5

Notes: For All Yield Goals

a) Half nitrogen and all phosphorus, potassium, sulphur and zinc should be applied and incorporated during land preparation.

b) Remaining nitrogen should be applied as broadcast at 30-35 DAS followed by irrigation.

c) In case of rainfed, all fertilizers should be applied as basal prior to sowing.

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KAON

(Var: Titash, BARI Kaon-2 and BARI Kaon-3)

Table 1: High Yield Goal (Yield: 3.0 ± 0.3 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0—20	0—8	0—14	0—3	—
Medium	21—40	9—16	15—28	4—6	0.0—0.7
Low	41—60	17—24	29—42	7—9	0.8—1.4
Very low	61—80	25—32	43—56	10—12	1.5—2.1

Table 2: Moderate Yield Goal (Yield: 2.5 ± 0.2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0—15	0—6	0—10	0—2	—
Medium	16—30	7—12	11—20	3—4	0.0—0.5
Low	31—45	13—18	21—30	5—6	0.6—1.0
Very low	46—60	19—24	31—40	7—8	1.1—1.5

Notes: For All Yield Goals

a) Half nitrogen and all phosphorus, potassium, sulphur and zinc should be applied and incorporated during land preparation.

b) Remaining nitrogen should be applied as broadcast at 30-35 DAS and 55-60 DAS followed by irrigation.

c) In case of rainfed, all fertilizers should be applied as basal prior to sowing.

Hasan

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FIBRE CROPS

JUTE (Corchorus capsularis)

(*Var.* D-154, CVL-1, CVE-3, CC-45, Atompat 38, Dalipat-5, Dalipat-6, BJRI Deshi-5, and BJRI Deshi-6)

Table 1: High Yield Goal (Yield: 3.5 ± 0.4 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0—20	0—6	0—18	0—4	—
Medium	21—40	7—12	19—36	5—8	0.0—1.0
Low	41—60	13—18	37—54	9—12	1.1—2.0
Very low	61—80	19—24	55—72	13—16	2.1—3.0

Table 1: Moderate Yield Goal (Yield: 2.8 ± 0.3 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0—14	0—4	0—13	0—3	—
Medium	15—28	5—8	14—26	4—6	0.0—0.6
Low	29—42	9—12	27—39	7—9	0.7—1.4
Very low	43—56	13—16	40—52	10—12	1.5—2.2

Notes: For All Yield Goals

a) One half of the nitrogen, and all phosphorus, potassium, sulphur and zinc should be broadcast and incorporated during final land preparation.

b) Remaining nitrogen should be top dressed and incorporated by hoeing after 40 to 45 days of sowing when the soil is moist or just prior to irrigation.

c) If cowdung is applied, it should be broadcast and incorporated about two weeks before sowing.

d) The dose of N, P, K & S may be reduced based on quantity of cowdung to be applied and as per Appendix-6.

e) In single jute cultivation, zinc will be applied only when it is deficient.

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JUTE
(Corchorus Olitorius)

(Var. Tosapat-2 (0-9897), BJRI Tosapat-3 (OM-1), BJRI Tosapat-4(0-72) and BINA deshipat-2)

Table 1: High Yield Goal (Yield: 4.5 ± 0.5 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0—35	0—7	0—27	0—7	—
Medium	36—70	8—14	28—54	8—14	0.0—2.6
Low	71—105	15—21	55—81	15—21	2.7—5.2
Very low	106—140	22—28	82—108	22—28	5.3—8.0

Table 1: Moderate Yield Goal (Yield: 3.5 ± 0.4 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0—25	0—5	0—19	0—5	—
Medium	26—50	5—10	20—38	5—10	0.0—2.0
Low	51—75	11—15	39—57	11—15	2.1—4.0
Very low	76—100	16—20	58—76	16—20	4.1—6.0

Notes: For All Yield Goals

a) One half of the nitrogen, and all phosphorus, potassium, sulphur and zinc should be broadcast and incorporated during final land preparation.

b) Remaining nitrogen should be top dressed and incorporated by hoeing after 40 to 45 days of sowing when the soil is moist or just prior to irrigation.

c) If cowdung is applied, it should be broadcast and incorporated about two weeks before sowing.

d) The dose of N, P, K & S may be reduced based on quantity of cowdung to be applied and as per Appendix-6.

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LATE JUTE SEED PRODUCTION

(Var: BJRI-2 and Falgooni Tossa-0-9897)

Yield Goal (kg/ha)	Fertilizer Recommendation (kg/ha)					
	N	P	K	S	Zn	B
High (600-950)	90	20	20	20	8	2
Medium(400-600)	50	15	10	20	4	1

Notes:

a) Total amount of phosphorus, potassium sulphur, zinc and boron should be broadcast and incorporated during final land preparation.

b) Nitrogen fertilizer should be applied in three equal splits. The first one third should be applied at the date of sowing as basal. The second and the third installments should be applied after 20-25 days and 40 to 45 days of seedings as top dressing.

c) Boron will be applied only in deficient soil.

Hasan

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COTTON
(All varieties)

Table 1: High Yield Goal (Yield: 2.5 ± 0.3 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0—37	0—11	0—33	0—6	—
Medium	38—74	12—22	34—66	7—12	0.0—2.0
Low	75—111	23—33	67—99	13—18	2.1—4.0
Very low	112—148	34—44	100—132	19—24	4.1—6.0

Table 1: Moderate Yield Goal (Yield: 2.0 ± 0.2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0—26	0—8	0—23	0—4	—
Medium	27—52	9—16	24—46	5—8	0.0—1.3
Low	53—78	17—24	47—69	9—12	1.4—2.6
Very low	79—104	25—32	70—92	13—16	2.7—4.0

Notes: For All Yield Goals

a) All phosphorus, potassium, sulphur and zinc and one third of nitrogen should be applied at final land preparation in the bottom of furrow and covered by 4-5 cm soil prior to planting.

b) Remaining nitrogen should be side dressed and covered with soil in two equal installments at 10 and 60 days after planting, when the soil is moist or just prior to irrigation.

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KENAF

(Var: HC—2 and HC—95)

Table 1: Average Yield Goal (Yield: 5.0 ± 0.5 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)			
	N	P	K	S
Optimum	0—11	0—3	0—8	0.0—1.5
Medium	12—22	4—6	9—16	1.6—3.0
Low	23—33	7—9	17—24	3.1—4.5
Very low	34—44	10—12	25—32	4.6—6.0

Notes:

a) One half of nitrogen, and all phosphorus, potassium and sulphur should be broadcast and incorporated during final land preparation.

b) Remaining nitrogen should be top dressed and incorporated by hoeing when the soil is moist or just to irrigation.

c) If cowdung is applied, it should be broadcast and incorporated about two weeks before sowing.

MESTA

(Var: HS—24)

Table 1: Average Yield Goal (Yield: 4.5 ± 0.45 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)			
	N	P	K	S
Optimum	0—10	0—3	0—11	0.0—1.0
Medium	11—20	4—6	12—22	1.1—2.0
Low	21—30	7—9	23—33	2.1—3.0
Very low	31—40	10—12	34—44	3.1—4.0

Notes:

a) One half of nitrogen, and all phosphorus, potassium and sulphur should be broadcast and incorporated during final land preparation.

b) Remaining nitrogen should be top dressed and incororated by hoeing when the soils is moist or just prior to irrigation.

c) If cowdung is applied, it should be broadcast and incorporated about two weeks before sowing.

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SUNHEMP
(Shonpat)

(Var: Kanpur-12, T-6)

Table 1: Average Yield Goal (Yield: 1.5 ± 0.15 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)			
	N	P	K	S
Optimum	0—5	0—3	0—6	0.0—1.5
Medium	6—10	4—6	7—12	1.6—3.0
Low	11—15	7—9	13—18	3.1—4.5
Very low	16—20	10—12	19—24	4.6—6.0

Notes:

a) One half of nitrogen, and all phosphorus, potassium and sulphur should be broadcast and incorporated during final land preparation.

b) Remaining nitrogen should be top dressed and incororated by hoeing when the soils is moist or just prior to irrigation.

c) If cowdung is applied, it should be broadcast and incorporated about two weeks before sowing.

Hasan

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PULSE CROPS

LENTIL

(Var: BARI Masur-1, BARI Masur-2, BARI Masur-3 and BARI Masur-4)

Table 1: High Yield Goal (Yield: 1.8 ± 0.2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Zn	B	Mo
Optimum	0—6	0—10	0—12	0—6	—	—	—
Medium	7—12	11—20	13—24	7—12	0.0—1.0	0.0—0.4	0—0.2
Low	13—18	21—30	25—36	13—18	1.1—2.0	0.5—0.8	0.3—0.4
Very low	19—24	31—40	37—48	19—24	2.1—3.0	0.9—1.2	0.5—0.6

Table 2: Moderate Yield Goal (Yield: 1.5 ± 0.15 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Zn	B	Mo
Optimum	0—5	0—9	0—10	0—5	—	—	—
Medium	6—10	10—18	11—20	6—10	0—0.7	0.0—0.3	0.0—0.15
Low	11—15	19—27	21—30	11—15	0.8—1.4	0.4—0.6	0.16—0.30
Very low	16—20	28—36	31—40	16—20	1.5—2.0	0.7—1.0	0.31—0.45

Notes: For All Yield Goals

a) All fertilizers should be broadcast and incorporated at the time of final land preparation

b) Inoculum (50 g for 1 kg seed or 1.5 kg inoculum/ha) must be used when available and in that case N fertilizer should not be used.

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CHICKPEA

(Var: BARI Chola-2, BARI Chola-3, BARI Chola-4, BARI Chola-5, BARI Chola-6 and BINA Chola-2)

Table 1: High Yield Goal (Yield: 2.5 ± 0.25 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Zn	B	Mo
Optimum	0—6	0—10	0—12	0—6	—	—	—
Medium	7—12	11—20	13—24	7—12	0.0—1.0	0.0—0.4	0—0.2
Low	13—18	21—30	25—36	13—18	1.1—2.0	0.5—0.8	0.3—0.4
Very low	19—24	31—40	37—48	19—24	2.1—3.0	0.9—1.2	0.5—0.6

Table 2: Moderate Yield Goal (Yield: 2.0 ± 0.2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Zn	B	Mo
Optimum	0—5	0—9	0—10	0—5	—	—	—
Medium	6—10	10—18	11—20	6—10	0—0.7	0.0—0.3	0.0—0.15
Low	11—15	19—27	21—30	11—15	0.8—1.4	0.4—0.6	0.16—0.30
Very low	16—20	28—36	31—40	16—25	1.5—2.4	0.7—0.9	0.31—0.45

Notes: For All Yield Goals

a) All fertilizers should be broadcast and incorporated at the time of final land preparation.

b) Inoculum (40g for 1 kg seed or 2 kg inoculum/ha) must be used when available and in that case N fertilizer should not be used.

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MUNGBEAN/GREENGRAM

(Var: BARI Mung-2, BARI Mung-3, BARI Mung-4, BARI Mung-5, BINA Mung-4, BINA Mung-5 and BAU Mung-1)

Table 1: High Yield Goal (Yield: 1.5 ± 0.15 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Zn	B	Mo
Optimum	0—6	0—10	0—12	0—6	—	—	—
Medium	7—12	11—20	13—24	7—12	0.0—1.0	0.0—0.4	0—0.2
Low	13—18	21—30	25—36	13—18	1.1—2.0	0.5—0.8	0.3—0.4
Very low	19—24	31—40	37—48	19—24	2.1—3.0	0.9—1.2	0.5—0.6

Table 2: Moderate Yield Goal (Yield: 1.2 ± 0.12 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Zn	B	Mo
Optimum	0—5	0—9	0—10	0—5	—	—	—
Medium	6—10	10—18	11—20	6—10	0.0—0.7	0.0—0.3	0.0—0.15
Low	11—15	19—27	21—30	11—15	0.8—1.4	0.4—0.6	0.16—0.30
Very low	16—20	28—36	31—40	16—25	1.5—2.0	0.7—1.0	0.31—0.45

Notes: For All Yield Goals

a) All fertilizers should be broadcast and incorporated at the time of final land preparation.

b) Inoculum (50 g for 1 kg seed or 1.5 kg inoculum/ha) must be used when available and in that case N fertilizer should not be used.

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BLACKGRAM

(Var: BARI Mash-1, BARI Mash-2, BARI Mash-3 and BINA Mash-1)

Table 1: High Yield Goal (Yield: 1.5 ± 0.2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)			
	N	P	K	S
Optimum	0—6	0—5	0—6	0—3
Medium	7—12	6—10	7—12	4—6
Low	13—18	11—15	13—18	7—9
Very low	19—24	16—20	19—24	10—12

Table 2: Moderate Yield Goal (Yield: 1.0 ± 0.2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)			
	N	P	K	S
Optimum	0—4	0—4	0—5	0—2
Medium	5—8	5—8	6—10	3—4
Low	9—12	9—12	11—15	5—6
Very low	13—16	13—16	16—20	7—8

Notes: For All Yield Goals

a) All fertilizers should be broadcast and incorporated at the time of final land preparation.

b) Inoculum (50 g inoculum for 1 kg seed or 1.5 kg inoculum/ha) must be used when available and in that case N fertilizer should not be used.

Hasan

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KHESARI (Grasspea)
(Var: BARI Khesari-1 and BARI Khesari-2)

Table 1: High Yield Goal (Yield: 1.5 ± 0.15 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)			
	N	P	K	S
Optimum	0—5	0—5	0—6	0—3
Medium	6—10	6—10	7—12	4—6
Low	11—15	11—15	13—18	7—9
Very low	16—20	16—20	19—24	10—12

Table 2: Moderate Yield Goal (Yield: 1.2 ± 0.1 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)			
	N	P	K	S
Optimum	0—4	0—3	0—4	0—2
Medium	5—8	4—6	5—8	3—4
Low	9—12	7—9	9—12	5—6
Very low	13—16	10—12	13—16	7—8

Notes: For All Yield Goals

a) All fertilizers should be broadcast and incorporated at the time of final land preparation.

b) Inoculum (40 g for 1 kg seed) must be used when available and in that case N fertilizer should not be used.

Hasan

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COWPEA
(Var: BARI Felon-1 and BARI Felon-2)

Table 1: High Yield Goal (Yield: 1.4 ± 0.14 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)			
	N	P	K	S
Optimum	0—5	0—5	0—6	0.0—2.5
Medium	6—10	6—10	7—12	2.6—5.0
Low	11—15	11—15	13—18	5.1—7.5
Very low	16—20	16—20	19—24	7.6—10.0

Table 2: Moderate Yield Goal (Yield: 1.0 ± 0.1 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)			
	N	P	K	S
Optimum	0—4	0—3	0—4	0—2
Medium	5—8	4—6	5—8	3—4
Low	9—12	7—9	9—12	5—6
Very low	13—16	10—12	13—16	7—8

Hasan

Notes: For All Yield Goals

a) All fertilizers should be broadcast and incorporated at the time of final land preparation.

b) Inoculum (40 g for 1 kg seed or 1.6 kg/ha) must be used when available and in that case N fertilizer should not be used.

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OIL SEED CROPS

MUSTARD *(Brassica napus and Brassica juncia)*

(Var: Daulat, BARI Sarisha-7, BARI Sarisha-8, BARI Sarisha-10, BARI Sarisha-11, BARI Sarisha-13, Rai-5, BINA Sarisha-3 and BINA Sarisha-4)

Table 1: High Yield Goal (Yield: 2.0 ± 0.2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Mg	Zn	B
Optimum	0—40	0—12	0—30	0—9	—	—	—
Medium	41—80	13—24	31—60	10—18	0—3	0.0—1.5	0.0—0.4
Low	81—120	25—36	61—90	19—27	4—6	1.6—3.0	0.5—0.8
Very low	121—160	37—46	91—120	28—36	7—9	3.1—4.5	0.9—1.2

Table 2: Moderate Yield Goal (Yield: 1.6 ± 0.16 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Mg	Zn	B
Optimum	0—28	0—9	0—22	0—7	—	—	—
Medium	29—56	10—18	23—44	8—14	0—2	0.0—1.0	0.0—0.3
Low	57—84	19—27	45—66	15—21	3—5	1.1—2.0	0.4—0.6
Very low	85—112	28—36	67—88	22—28	6—8	2.1—3.0	0.7—0.9

Notes: For All Yield Goals

a) Half nitrogen and all the phosphorus, potassium, sulphur, magnesium, zinc and boron should be applied as broadcast and incorporated during final land preparation.

b) Remaining half nitrogen should be applied at the time of flower initiation (25 days after seeding) as top dressing followed by irrigation (if moisture is insufficient).

c) In case of rainfed, all fertilizers should be applied as basal prior to seeding.

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MUSTARD

(Brassica campestris)

(Var: Tori-7, BARI sarisha-6, BARI sarisha-9, BARI sarisha-12, BT-303, TS-72, SS-75, Binasarisha-5, Binasarisha-6, Safal and Agrani)

Table 1: High Yield Goal (Yield: 1.5 ± 0.2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Mg	Zn	B
Optimum	0—25	0—8	0—20	0—5	—	—	—
Medium	26—50	9—16	21—40	6—10	0.0—2.5	0.0—1.0	0.0—0.4
Low	51—75	17—24	41—60	11—15	2.6—5.0	1.1—2.0	0.5—0.6
Very low	76—100	25—32	61—80	16—20	5.1—7.5	2.1—3.0	0.7—0.8

Table 2: Moderate Yield Goal (Yield: 1.2 ± 0.1 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Mg	Zn	B
Optimum	0—18	0—6	0—15	0—4	—	—	—
Medium	19—36	7—12	16—30	5—8	0.0—2.0	0.0—0.7	0.0—0.3
Low	37—54	13—18	31—45	9—12	3.0—4.0	0.8—1.4	0.4—0.5
Very low	55—72	19—24	46—60	13—16	5.0—6.0	1.5—2.1	0.6—0.7

Notes: For All Yield Goals

a) Half nitrogen and all the phosphorus, potassium, sulphur, magnesium, zinc and boron should be applied as broadcast and incorporated during final land preparation.

b) Remaining half nitrogen should be applied at the time of flower initiation (20 days after seeding) as top dressing followed by irrigation (if moisture is insufficient).

c) In case of rainfed, all fertilizers should be applied as basal prior to seeding.

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SESAME (TIL)

(Var: BARI Til-1, BARI Til -2, BARI Til-3 and BINA Til- 1)

Table 1: High Yield Goal (Yield: 1.3 ± 0.13 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)					
	N	P	K	S	Zn	B
Optimum	0—26	0—9	0—16	0—7	—	—
Medium	27—52	10—18	17—32	8—14	0.0—1.3	0.0—0.3
Low	53—78	19—27	33—48	15—21	1.4—2.6	0.4—0.6
Very low	79—104	28—36	49—64	22—28	2.7—4.0	0.7—0.9

Table 2: Moderate Yield Goal (Yield: 1.0 ± 0.1 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)					
	N	P	K	S	Zn	B
Optimum	0—18	0—7	0—11	0—5	—	—
Medium	19—36	8—14	12—22	6—10	0—1.0	0—0.2
Low	37—54	15—21	23—33	11—15	1.1—2.0	0.3—0.4
Very low	55—72	22—28	34—44	16—20	2.1—3.0	0.5—0.6

Notes: For All Yield Goals

a) One half of nitrogen, and all phosphorus, potassium, sulphur, zinc and boron should be broadcast and incorporated during final land preparation.

b) Remaining nitrogen should be applied as top dressing at 25-30 days after sowing followed by irrigation (if moisture is insufficient).

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SUNFLOWER
{Var: Kironi (DS-1) }

Table 1: High Yield Goal (Yield: 1.5 ± 0.15 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Mg	Zn	B
Optimum	0—35	0—10	0—20	0—10	—	—	—
Medium	36—70	11—20	21—40	11—20	0—3.0	0.0—1.0	0.0—0.4
Low	71—105	21—30	41—60	21—30	4.0—6.0	1.1—2.0	0.5—0.8
Very low	106—140	31—40	61—80	31—40	7.0—9.0	2.1—3.0	0.9—1.2

Table 2: Moderate Yield Goal (Yield: 1.2 ± 0.1 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Mg	Zn	B
Optimum	0—28	0—7	0—14	0—7	—	—	—
Medium	23—56	8—14	15—28	8—14	0.0—2.0	0.0—0.7	0—0.3
Low	57—84	15—21	29—42	15—21	2.1—4.0	0.8—1.4	0.4—0.6
Very low	85—112	22—28	43—56	22—28	5.0—6.0	1.5—2.1	0.7—0.9

Notes: For All Yield Goals

a) Half nitrogen and all the phosphorus, potassium, sulphur, magnesium, zinc and boron should be applied as broadcast and incorporated during final land preparation.

b) Remaining nitrogen should be applied as top dressing at 20-25 DAS and 40-45 DAS (before flower initiation stage) followed by irrigation.

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GROUNDNUT

(Var: Jhinga Badam, Maichar Badam, Tridana Badam(DM-1), Basanti Badam, BARI Chinabadam-5, BARI Chinabadam-6, BINA Chinabadam-1, BINA Chinabadam-2 and BINA Cinabadam-3)

Table 1: High Yield Goal (Yield: 2.5 ± 0.3 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Zn	B	Mo
Optimum	0—15	0—12	0—25	0—10	—	—	—
Medium	16—30	13—24	26—50	11—20	0—1.0	0—0.5	0—0.3
Low	31—45	25—36	51—75	21—30	1.1—2.0	0.6—1.0	0.4—0.6
Very low	46—60	37—48	76—100	31—40	2.1—3.0	1.1—1.5	0.7—0.9

Table 2: Moderate Yield Goal (Yield: 2.0 ± 0.2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Zn	B	Mo
Optimum	0—11	0—10	0—18	0—7	—	—	—
Medium	12—22	11—20	19—36	8—14	0—0.7	0.0—0.3	0.0—0.20
Low	23—33	21—30	37—54	15—21	0.8—1.4	0.4—0.6	0.21—0.40
Very low	34—44	31—40	55—72	22—28	1.5—2.1	0.7—0.9	0.41—0.60

Notes: For All Yield Goals

a) Half nitrogen and all the phosphorus, potassium, sulphur, magnesium, zinc, boron and molybdenum should be applied as broadcast and incorporated during final land preparation.

b) Remaining nitrogen should be applied as top dressing at flowering stage and covered by soil followed by irrigation.

c) Inoculum (30 g for 1 kg seed) must be used when available and in that case N fertilizer should not be used.

d) Incase of rainfed, all fertilizers should be applied as basal prior to seeding.

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SOYBEAN

(Var: Sohagh, BARI Soybean-4 and BARI Soybean-5)

Table 1: High Yield Goal (Yield: 2.0 ± 0.2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Zn	B	Mo
Optimum	0—8	0—10	0—20	0—5	—	—	—
Medium	9—16	11—20	21—40	6—10	0—1.0	0.0—0.4	0.0—0.3
Low	17—24	21—30	11—60	11—15	1.0—2.0	0.5—0.8	0.4—0.6
Very low	25—32	31—40	61—80	16—20	2.0—3.0	0.9—1.2	0.7—0.9

Table 2: Moderate Yield Goal (Yield: 1.6 ± 0.16t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						
	N	P	K	S	Zn	B	Mo
Optimum	0—6	0—8	0—15	0—4	—	—	—
Medium	7—12	9—16	16—30	5—8	0—0.7	0—0.3	0—0.2
Low	13—18	17—24	31—45	9—12	0.8—1.4	0.4—0.5	0.3—0.4
Very low	19—24	25—32	46—60	13—16	1.5—2.1	0.6—0.9	0.5—0.6

Notes: For All Yield Goals

a) All fertilizers should be applied as broadcast and thoroughly mixed with the soil prior to sowing.

b) Inoculum (20 g for 1 kg seed) must be used for soybean cultivation and in that case N fertilizer should not be used.

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LINSEED
(Var: Neela)

Table 1: Average Yield Goal (Yield: 1.0 ± 0.1 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)			
	N	P	K	S
Optimum	0—15	0—5	0—8	0—3
Medium	16—30	6—10	9—16	4—6
Low	31—45	11—15	17—24	7—9
Very low	46—60	16—20	25—32	10—12

Notes:

a) Half nitrogen and all the phosphorus, potassium, sulphur should be applied as broadcast and incorporated during final land preparation.

b) Remaining half nitrogen should be applied at the time of flower initiation (20 days after seeding) as top dressing followed by irrigation (if moisture is insufficient).

c) In case of rainfed, all fertilizers should be applied as basal prior to seeding.

SAFFLOWER
(Var: BARI Saf—1)

Table 1. Average Yield Goal (Yield: 1.5 ± 0.2 t/ha

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)			
	N	P	K	S
Optimum	0—16	0—6	0—8	0—3
Medium	17—32	7—12	9—16	4—6
Low	33—48	13—18	17—24	7—9
Very low	49—64	19—24	25—32	10—12

Notes:

a) One half of nitrogen, and all phosphorus, potassium and sulphur should be broadcast and incorporated during final land preparation.

b) Remaining nitrogen should be applied as top dressing at 25-30 day after seeding followed by irrigation (if moisture is insufficient).

c) In case of rainfed, all fertilizers should be applied at the time of final land preparation.

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NIGER

(Kusum Ful)

(Var: Shova)

Table 1. Average Yield Goal (Yield: 1.5 ± 0.2 t/ha

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)			
	N	P	K	S
Optimum	0—15	0—5	0—8	0—3
Medium	16—30	6—10	9—16	4—6
Low	31—45	11—15	17—24	7—9
Very low	46—60	16—20	25—32	10—12

Notes:

a) One half of nitrogen, and all phosphorus, potassium and sulphur should be broadcast and incorporated during final land preparation.

b) Remaining nitrogen should be applied as top dressing at 3-4 weeks after seeding followed by irrigation (if moisture is insufficient).

c) In case of rainfed, all fertilizer should be applied at the time of final land preparation.

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ROOT AND TUBER CROPS

POTATO

(Var: Heera, Ailsha, Diamont, Cardinal, BARI Alu-11, BARI Alu-12, BARI Alu-13, BARI Alu-15, BARI Alu-16, BARI Alu-17, BARI Alu-18, BARI Alu-19 and BARI Alu-20)

Table 1: High Yield Goal (Yield: 30 ± 3 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)							CD/OM (t/ha)
	N	P	K	S	Mg	Zn	B	
Optimum	0—45	0—10	0—45	0—5	—	—	—	—
Medium	46—90	11—20	46—90	6—10	0—5	0—2.0	0.0—0.4	2
Low	91—135	21—30	91—135	11—15	6—10	3.0—4.0	0.5—0.8	4
Very low	136—180	31—40	136—180	16—20	11—15	5.0—6.0	0.9—1.2	6

Table 2: Moderate Yield Goal (Yield: 25 ± 2.5 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)							CD/OM (t/ha)
	N	P	K	S	Mg	Zn	B	
Optimum	0—32	0—8	0—32	0—4	—	—	—	—
Medium	33—64	9—16	33—64	5—8	0—4	0.0—1.5	0.0—0.3	2
Low	65—96	17—24	65—96	9—12	5—8	1.6—3.0	0.4—0.6	3
Very low	97—128	25—32	97—128	13—16	9—12	3.1—4.5	0.7—0.9	4

Notes: For All Yield Goals

a) All cowdung, phosphorus, sulphur, magnesium, zinc, boron and half of nitrogen and potassium should be applied before planting and mixed with soil.

b) Remaining nitrogen and potassium should be applied at the side of the row and covered with soil about 30-35 DAP at the time of earthing up followed by irrigation.

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SWEET POTATO

(Var: Tripti, Kamala Shunduri, BARI Mistialu-3 (Daulatpuri), BARI Mistialu-4 and BARI Mistialu-5)

Table 1: High Yield Goal (Yield: 40.0 ± 4.0 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)							CD/OM (t/ha)
	N	P	K	S	Mg	Zn	B	
Optimum	0—35	0—15	0—35	0—5	—	—	—	—
Medium	36—70	16—30	36—70	6—10	0—4	0.0—1.0	0.0—0.4	2
Low	71—105	31—45	71—105	11—15	5—8	1.1—2.0	0.5—0.8	4
Very low	106—140	46—60	106—140	16—20	9—12	2.1—3.0	0.9—1.2	6

Table 2: Moderate Yield Goal (Yield: 30.0 ± 3.0 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)							CD/OM (t/ha)
	N	P	K	S	Mg	Zn	B	
Optimum	0—25	0—12	0—25	0—4	—	—	—	—
Medium	26—50	13—24	26—50	5—8	0—3	0.0—0.7	0.0—0.3	2
Low	51—75	25—36	51—75	9—12	4—6	0.71—1.4	0.4—0.6	3
Very low	76—100	37—48	76—100	13—16	7—9	1.41—2.1	0.7—0.9	4

Notes: For All Yield Goals

a) All cowdung, phosphorus, potassium, sulphur, magnesium, zinc and boron and half of nitrogen should be applied before planting and mixed with soil.

b) Remaining nitrogen should be applied at the side of the row and covered with soil about 30-35 DAT at the time of earthing up followed by irrigation.

c) Incase of rainfed, all fertilizers should be applied at the time of final land preparation.

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AROIDS

MUKHI KACHU

(Var: Bilashi & others)

Table 1: Average Yield Goal (Yield: 30 ± 3 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				CD/OM (t/ha)
	N	P	K	S	
Optimum	0—32	0—9	0—27	0—6	—
Medium	33—64	10—18	28—54	7—12	2.0
Low	65—96	19—27	55—81	13—18	3.0
Very low	97—128	28—36	82—108	19—24	4.0

Note:

a) All phosphorus, potassium, sulphur and organic manure should be applied prior to seeding.

b) Nitrogen should be side dressed in two equal installments at 15-20 and 40-45 days after germination.

PANI KACHU

(Var: Latiraj & others)

Table 1: Average Yield Goal (Yield: 30 ± 3 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				CD/OM (t/ha)
	N	P	K	S	
Optimum	0—32	0—9	0—27	0—6	—
Medium	33—64	10—18	28—54	7—12	2.0
Low	65—96	19—27	55—81	13—18	3.0
Very low	97—128	28—36	82—108	19—24	4.0

Note:

a) All phosphorus, potassium, sulphur and organic manure should be applied prior to seeding.

b) Nitrogen should be side dressed in two equal installments at 30 and 60 days after planting (DAP).

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VEGETABLE CROPS
CABBAGE

(Var: K-K Cross, Atlas-70, and Hybrids)

Table 1: High Yield Goal (Yield: 100.0 ± 10.0 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)							CD/OM (t/ha)
	N	P	K	S	Zn	B	Mo	
Optimum	0—60	0—35	0—20	0—10	—	—	—	—
Medium	61—120	36—70	21—40	11—20	1.0—2.0	0—0.4	0—0.3	4
Low	121—180	71—105	41—60	27—30	3.0—4.0	0.5—0.8	0.4—0.6	6
Very low	181—240	106—140	61—80	31—40	5.0—6.0	0.9—1.2	0.7—1.0	8

Table 2: Moderate Yield Goal (Yield: 80.0 ± 8.0 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)							CD/OM (t/ha)
	N	P	K	S	Zn	B	Mo	
Optimum	0—42	0—25	0—14	0—8	—	—	—	—
Medium	43—84	26—50	15—28	9—16	1.0—2.0	0—0.3	0—0.2	3
Low	85—126	51—75	29—42	17—24	2.1—3.0	0.4—0.6	0.3—0.4	4
Very low	127—168	76—100	43—56	25—32	3.1—4.0	0.7—0.9	0.5—0.7	5

Notes: For All Yield Goals

a) All cowdung and full phosphorus, sulphur, zinc, boron and molybdenum should be broadcast and incorporated during final land preparation

b) Nitrogen and potassium should be applied in two equal installments at 15 and 35 days after transplanting as ring method around the plants followed by irrigation (depending on soil moisture).

c) Urea Supper Granules (USG) (instead of urea) should be applied 9-10 cm apart from base of plant and 7-8 cm deep as ring method. However, attention should be given so that plant base is not disturbed (where USG is placed)

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CABBAGE

(Var: BARI Badhacopy-1 (Provati), BARI Badhacopy-2 (Agradutt) and IPSA Cabbage)

Table 1: High Yield Goal (Yield: 55.0 ± 5.5 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)							CD/OM (t/ha)
	N	P	K	S	Zn	B	Mo	
Optimum	0—40	0—15	0—20	0—6	0.0—1.0	—	—	—
Medium	41—80	16—30	21—40	7—12	1.1—2.0	0—0.4	0—0.3	4
Low	81—120	31—45	41—60	13—18	2.1—3.0	0.5—0.8	0.4—0.6	6
Very low	121—160	46—60	61—80	18—24	3.1—4.0	0.9—1.2	0.7—1.0	8

Table 2: Moderate Yield Goal (Yield: 44.0 ± 4.4 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)							CD/OM (t/ha)
	N	P	K	S	Zn	B	Mo	
Optimum	0—30	0—12	0—16	0—4	0.0—0.8	—	—	—
Medium	31—60	13—24	17—32	5—8	0.81—1.6	0—0.3	0—0.2	3
Low	61—90	25—36	33—48	9—12	1.61—2.4	0.4—0.6	0.3—0.4	4
Very low	91—120	37—48	49—64	13—16	2.41—3.2	0.7—0.9	0.5—0.7	5

Notes: For All Yield Goals

a) All cowdung and full phosphorus, sulphur, zinc, boron and molybdenum should be broadcast and incorporated during final land preparation

b) Nitrogen and potassium should be applied in two equal installments at 15 and 35 days after transplanting as ring method around the plants followed by irrigation (depending on soil moisture).

c) Urea Supper Granules (USG) (instead of urea) should be applied 9-10 cm apart from base of plant and 7-8 cm deep as ring method. However, attention should be given so that plant base is not disturbed (where USG is placed)

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CAULIFLOWER

(Var: BARI Fulcopy-1 (Rupa) & others)

Table 1: High Yield Goal (Yield: 35.0 ± 3.5 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)							CD/OM (t/ha)
	N	P	K	S	Zn	B	Mo	
Optimum	0—40	0—20	0—40	0—8	—	—	—	-
Medium	41—80	21—40	41—80	9—16	1.0—2.0	0.0—0.6	0.0—0.3	4
Low	81—120	41—60	81—120	17—24	2.1—3.0	0.7—0.8	0.4—0.6	6
Very low	121—160	61—80	121—160	25—32	3.1—4.0	0.9—1.0	0.7—0.9	8

Table 2. Moderate Yield Goal (Yield: 28.0 ± 2.8 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)							CD/OM (t/ha)
	N	P	K	S	Zn	B	Mo	
Optimum	0—28	0—15	0—30	0—5	—	—	—	-
Medium	29—56	16—30	31—60	6—10	0—1.0	0.7—1.4	0.0—0.2	2
Low	57—84	31—45	61—90	11—15	1.1—2.0	1.5—0.6	0.3—0.4	4
Very low	85—112	46—60	91—120	16—20	2.1—3.0	0.7—0.8	0.4—0.6	6

Notes: For All Yield Goals

a) Half of cowdung and full of phosphorus, sulphur, zinc, boron and molybdenum should be broadcast and incorporated during final land preparation.

b) Remaining cowdung should be applied in pits prior to planting.

c) Nitrogen and potassium should be applied in three installments at 10-15, 30 and 50 days after transplanting as ring method around the plants followed by irrigation (depending of soil moisture).

d) Urea Supper Granules (USG)(instead of urea) should be applied 9-10 cm apart from base of plant and 7-8 cm deep as ring method. However, attention should be given so that plant base is not disturbed (where USG is placed)

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CHINEES CABBAGE
(Var. BARI Chinees Copi-1)

Table 1: Average Yield Goal (Yield: 25 ± 3 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				CD/OM (t/ha)
	N	P	K	S	
Optimum	0—53	0—17	0—48	0—8	—
Medium	54—106	18—34	94—96	9—16	4
Low	107—159	35—51	97—144	17—24	6
Very low	160—212	52—68	145—192	25—32	8

Notes:

a) All cowdung/compost, phosphorus, sulphur and one half of nitrogen and potassium should be broadcast and incorporated during final land preparation.

b) Remaining nitrogen and potassium should be applied at 20 days after seeding followed by irrigation.

BROCCOLI
(All Varieties)

Table 1: High Yield Goal (Yield: 25.0 ± 3.0 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)							CD/OM (t/ha)
	N	P	K	S	Zn	B	Mo	
Optimum	0—35	0—12	0—20	0—6	—	—	—	—
Medium	36—70	13—24	21—40	7—12	0—1.0	0.0—0.6	0.0—0.2	4
Low	71—105	25—36	41—60	13—18	1.1—2.0	0.7—1.2	0.3—0.4	6
Very low	106—140	37—48	61—80	19—24	2.1—3.0	1.3—1.8	0.5—0.6	8

Notes:

a) Half of cowdung and full dose of phosphorus, sulphur, zinc, boron and molybdenum should be broadcast and incorporated during final land preparation.

b) Remaining cowdung should be applied in pits prior to planting.

c) Nitrogen and potassium should be applied in two equal installments at 15 and 35 days after transplanting as ring method around the plants followed by irrigation.

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CHINA SHAK (BATISAK)

(Var. BARI Batisak and BARI China Copy-1)

Table 1: High Yield Goal (Yield: 30 ± 3 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				OM (t/ha)
	N	P	K	S	
Optimum	0—50	0—10	0—30	0—8	—
Medium	51—100	11—20	31—60	9—16	4
Low	101—150	21—30	61—90	17—24	6
Very low	151—200	31—40	91—120	25—32	8

Table 2: Moderate Yield Goal (Yield: 24 ± 2.4 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				OM (t/ha)
	N	P	K	S	
Optimum	0—35	0—7	0—21	0—6	—
Medium	36—70	8—14	22—42	7—12	3
Low	71—105	15—21	43—63	13—18	4
Very low	106—140	22—28	64—84	19—24	5

Notes: For All Yield Goals

a) All cowdung/compost, phosphorus, sulphur, one half of nitrogen and potassium should be broadcast and incorporated during final land preparation.

b) Remaining nitrogen and potassium should be applied at 20 days after seeding followed by irrigation.

Hasan

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TOMATO

(Var: Manik, Ratan, BARI Tomato-3, BARI Tomato-4, BARI Tomato-5, BARI Tomato-6, BARI Tomato-7, BARI Tomato-8, BARI Tomato-9, BARI Tomato-10, Bina tomato-2 and Bina tomato-3 & others)

Table 1: High Yield Goal (Yield: 80.0 ± 8.0 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						CD/OM (t/ha)
	N	P	K	S	Zn	B	
Optimum	0—40	0—12	0—25	0—5	—	—	-
Medium	41—80	13—24	26—50	6—10	0.0—1.0	0.0—0.3	3
Low	81—120	25—36	51—75	11—15	1.1—2.0	0.31—0.6	4
Very low	121—160	37—48	76—100	16—20	2.1—3.0	0.61—4.0	5

Table 2: Moderate Yield Goal (Yield: 64.0 ± 6.4 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						CD/OM (t/ha)
	N	P	K	S	Zn	B	
Optimum	0—28	0—10	0—18	0—4	—	—	-
Medium	29—50	11—20	19—36	5—8	0.0—0.7	0.0—0.2	3
Low	51—84	21—30	37—54	9—12	0.8-1.4	0.21—0.4	4
Very low	85—112	31—40	55—72	13—16	1.5—2.0	0.41—0.7	5

Notes: For All Yield Goals

a) Half of cowdung and full phosphorus, sulphur, zinc and boron should be broadcast and incorporated during final land preparation.

b) Remaining cowdung should be applied in pits prior to planting.

c) Nitrogen and potassium should be applied in two equal installments at 15 and 35 days after transplanting as ring method around the plants followed by irrigation (depending on soil moisture).

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BRINJAL

(Var: Uttara, Tarapuri, Kajla and BARI Begun-5 (Nayan Tara)

Table 1: High Yield Goal (Yield: 65.0 ± 5.0 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						CD/OM (t/ha)
	N	P	K	S	Zn	B	
Optimum	0—40	0—12	0—30	0—5	—	—	-
Medium	41—80	13—24	31—60	6—10	0.0—1.0	0.0—0.3	4
Low	81—120	25—36	61—90	11—15	1.1—2.0	0.4—0.6	6
Very low	121—160	37—48	91—120	16—20	2.1—3.0	0.7—0.9	8

Table 2: Moderate Yield Goal (Yield: 52.0 ± 5.2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						CD/OM (t/ha)
	N	P	K	S	Zn	B	
Optimum	0—28	0—9	0—20	0—4	—		2
Medium	29—56	10—18	21—40	5—8	0.0—0.7	0.0-0.2	3
Low	57—84	19—27	41—60	9—12	0.8—1.4	0.21-0.4	4
Very low	85—112	28—36	61—80	13—16	1.5—2.0	0.41-0.6	5

Notes: For All Yield Goals:

a) Half of cowdung should be applied at the time of final land preparation.

b) Remaining cowdung and full phosphorus, sulphur, zinc and boron should be applied in pit before one week of transplanting.

c) Nitrogen and potasium should be applied in three equal splits at 21, 35 and 50 DAT as ring method around the plants followed by irrigation (10-15 days interval during dry season).

d) Urea Supper Granules (USG) (instead of urea) should be applied 9-10 cm apart from base of plant and 7-8 cm deep as ring method. However, attention should be given so that plant base is not disturbed (where USG is placed).

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LADY'S FINGER
(OKRA)
(Var: BARI Dherosh-1 & others)

Table 1: High Yield Goal (Yield: 16.0 ± 1.6 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						CD/OM (t/ha)
	N	P	K	S	Zn	B	
Optimum	0—30	0—10	0—20	0—5	—	—	—
Medium	31—60	11—20	21—40	6—10	0.0—1.0	0.0—0.6	2
Low	61—90	21—30	41—60	11—15	1.1—2.0	0.7—1.2	4
Very low	91—120	31—40	61—80	16—20	2.1—3.0	1.3—1.8	6

Table 2: Moderate Yield Goal (Yield: 12.0 ± 1.2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						CD/OM (t/ha)
	N	P	K	S	Zn	B	
Optimum	0—21	0—8	0—15	0—4	—	—	—
Medium	22—42	9—16	16—30	5—8	0.0—0.7	0.0—0.4	2
Low	43—63	17—24	31—45	9—12	0.8—1.4	0.5—0.8	4
Very low	64—84	25—32	46—60	13—16	1.5—2.1	0.9—1.2	6

Notes: For All Yield Goals

a) Cowdung, half of nitrogen and all phosphorus, potassium, sulphur, zinc and boron should be applied at the time of land preparation.

b) Remaining nitrogen should be applied around the plant and incorporated with soil at 3rd and 5th week after sowing followed by irrigation (if moisture is insufficient).

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RADISH

(BARI Mula-1 (Tasakisan Mula), BARI Mula-2(Pinky) and BARI Mula-3 (Druti)

Table 1: High Yield Goal (Yield: 60.0 ± 6.0 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)					CD/OM (t/ha)
	N	P	K	S	Zn	
Optimum	0—50	0—15	0—40	0—8	—	—
Medium	51—100	16—30	41—80	9—16	0—2.0	4
Low	101—150	31—45	81—120	17—24	2.1—3.0	6
Very low	151—200	46—60	121—160	25—32	3.1—4.0	8

Table 2: Moderate Yield Goal (Yield: 48.0 ± 4.8 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)					CD/OM (t/ha)
	N	P	K	S	Zn	
Optimum	0—35	0—12	0—35	0—6	—	—
Medium	36—70	13—24	36—70	7—12	0.0—1.5	2
Low	71—105	25—36	71—105	13—18	1.6—2.0	4
Very low	106—140	37—48	106—140	19—24	2.1—2.5	6

Notes: For All Yield Goals

a) All cowdung, phosphorus, potassium, sulphur, zinc and one third of nitrogen should be applied and incorporated during final land preparation.

b) Remaining nitrogen should be side dressed in two equal installments at 15 and 30 DAS followed by irrigation.

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CARROT

(All varieties)

Table 1: High Yield Goal (Yield: 20 ± 2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				CD/OM (t/ha)
	N	P	K	S	
Optimum	0—40	0—13	0—30	0—8	1.5
Medium	41—80	14—26	31—60	9—16	3.0
Low	81—120	27—39	61—90	17—24	4.5
Very low	121—160	40—52	91—120	25—32	6.0

Notes:

a) All cowdung, phosphorus, potassium, sulphur and one third nitrogen should be applied as broadcast and incorporated during final land preparation.

b) Remaining nitrogen should be applied in two equal installments at 3 and 5 weeks after sowing/seeding followed by irrigation.

COUNTRY BEAN/SHIM

(Var. BARI Shim-1, BARI Shim-2, IPSA Shim-2 & others)

Table 1: High Yield Goal (Yield: 25.0 ± 2.5 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)					CD/OM (t/ha)
	N	P	K	S	Zn	
Optimum	0—25	0—10	0—15	0—3	—	—
Medium	26—50	11—20	16—30	4—6	0.0—1.0	4
Low	51—75	21—30	31—45	7—9	1.1—2.0	6
Very low	76—100	31—40	46—60	10—12	2.1—3.0	8

Notes:

a) All cowdung, phosphorus, potassium, sulphur and zinc should be applied and incorporated during final land preparation.

b) Nitrogen should be applied in 2 splits at 7 DBP and 30 DAT followed by irrigation.

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WINGED BEAN/YARDLONG BEAN
(Barboti)
(All varieties)

Table 1: Average Yield Goal (Yield: 10 ± 1 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)					
	N	P	K	S	Zn	B
Optimum	0—6	0—9	0—11	0—3	—	—
Medium	7—12	10—18	12—22	4—6	0.0—0.6	0.0—0.6
Low	13—18	19—27	23—33	7—9	0.7—1.2	0.7—1.2
Very low	19—24	28—26	34—44	10—12	1.3—2.0	1.3—2.0

Notes:

a) All fertilizers except nitrogen should be applied and incorporated during final land preparation.

b) Nitrogen should be applied in two equal installments at 2 and 4 weeks after germination.

c) Inoculum (50 g inoclum for 1 kg seed) must be used when available and in that case N fertilizer must not be used.

FRENCH BEAN (FARASHI SHIM)
(Var. BARI Jharshim-1 and BARI Jharshim-2)

Table 1: High Yield Goal (Yield: 15.0 ± 1.5 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)					CD/OM (t/ha)
	N	P	K	S	Zn	
Optimum	0—30	0—10	0—15	0—3	—	—
Medium	31—60	11—20	16—30	4—6	0.0—1.0	4
Low	61—90	21—30	31—45	7—9	1.0—2.0	6
Very low	91—120	31—40	46—60	10—12	2.1—3.0	8

Notes:

a) All cowdung, phosphorus, potassium, sulphur, zinc and half of nitrogen should be applied and incorporated during final land preparation.

b) Remaining nitrogen should be side dressed at 30 DAS followed by irrigation (if moisture is insufficient).

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FIELD PEA

(Var: BARI Motorshuti-1, BARI Motorshuti-2, BARI Motorshuti-3 and IPSA Motorshuti -1, IPSA Motorshuti -2 and IPSA Motorshuti -3)

Table 1: High Yield Goal (Yield: 15.0 ± 1.5 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)					CD/OM (t/ha)
	N	P	K	S	Zn	
Optimum	0—15	0—7	0—10	0—3	—	—
Medium	16—30	8—14	11—20	4—6	0.0—0.7	4
Low	31—45	15—21	21—30	7—9	0.8—1.4	6
Very low	46—60	22—28	31—40	10—12	1.5—2.0	8

Notes:

a) All fertilizers and cowdung should be applied one week before sowing.

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SWEET GOURD, BOTTLE GOURD

(Var. BARI Lau-1 and other varieties)

Table 1: High Yield Goal (Yield: 40 ± 4 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (g/pit)						OM (t/ha)
	N	P	K	S	Zn	B	
Optimum	0—20	0—9	0—25	0—6	—	—	0.5
Medium	21—40	10—18	26—50	7—12	0.0—0.7	0.0—0.6	1.0
Low	41—60	19—27	51—75	13—18	0.8—1.4	0.7—1.2	1.5
Very low	61—80	28—36	76—100	19—24	1.5—2.1	1.3—2.0	2.0

Notes:

a) All phosphorus, potassium, sulphur, zinc, boron and organic manure should be applied in pit 5-7 days prior to planting.

b) Nitrogen should be applied around the plant by side dressing at 30 and 50 days after planting and mixed with soil followed by irrigation

ASH GOURD

(Var. IPSA Ash gourd-1 & others)

Table 1: High Yield Goal (Yield: 40 ± 4.0 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)							CD/OM (t/ha)
	N	P	K	S	Zn	B	Mo	
Optimum	0—35	0—12	0—20	0—6	—	—	—	—
Medium	36—70	13—24	21—40	7—12	0—1.0	0—0.6	0—0.2	4
Low	71—105	25—36	41—60	13—18	1.1—2.0	0.7—1.2	0.3—0.4	6
Very low	106—140	37—48	61—80	19—24	2.1—3.0	1.3—1.8	0.5—0.6	8

Notes:

a) All cowdung, phosphorus, potassium, sulphur, zinc, boron and molybdenum should be broadcast and incorporated during final land preparation.

b) Nitrogen should apply as side dressing at 4-5 DAT and 21 DAT followed by irrigation (if moisture is insufficient).

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TEASLE GOURD (Kakrol)
(All Varieties)

Table 1: High Yield Goal (Yield: 18 ± 2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (g/pit)						OM (t/ha)
	N	P	K	S	Zn	B	
Optimum	0—15	0—3	0—14	0—6	—	—	-
Medium	16—30	4—6	15—28	7—12	0.0—1.3	0.0—0.6	2
Low	31—45	7—9	29—42	13—18	1.4—2.6	0.7—1.2	3
Very low	46—60	10—12	43—56	19—24	2.7—4.0	1.3—2.0	4

Notes:

a) All phosphorus, potassium, sulphur, zinc, boron and organic manure should be applied in pit 4-5 days prior to planting.

b) Nitrogen should be applied in two equal installments at 2 and 4 weeks after germination followed by irrigation.

BITTER GOURD (Karala)
(All varieties)

Table 1: High Yield Goal (Yield: 25 ± 2.5 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (g/pit)				OM (t/ha)
	N	P	K	S	
Optimum	0-20	0-10	0-10	0-2	-
Medium	21-40	11-20	11-20	3-4	1-1.5
Low	41-60	21-30	21-30	5-6	1.6-2.0
Very low	61-80	31-40	31-40	7-8	2.1-2.5

Notes:

a) All phosphorus, potassium, sulphur and organic manure should be applied in pit 4-5 days prior to planting.

b) Nitrogen should be applied in two equal installments at 2 and 4 weeks after germination followed by irrigation (if moisture is insufficient).

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POINTED GOURD
(All varieties)

Average yield goal (12-14 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)					CD/OM (t/ha)
	N	P	K	S	Zn	
Optimum	0—30	0—6	0—12	—	—	2
Medium	31—60	7—12	13—24	0—3	0—1	4
Low	61—90	13—18	25—36	4—6	1—2	6
Very low	91—120	19—24	36—48	7—9	2—3	9

Note:

a) All phosphorus, potassium, sulphur, zinc and organic manure should be applied in pit 4-5 days prior to planting.

b) Nitrogen should be applied in four equal installments at 3, 6, 9 and 12 weeks after planting.

CUCUMBER
(All varieties)

Table 1: High Yield Goal (Yield: 16 ± 2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (g/pit)				OM (t/ha)
	N	P	K	S	
Optimum	0—15	0—8	0—16	0—6	2
Medium	16—30	9—16	17—32	7—12	3
Low	31—45	17—24	33—48	13—18	4
Very low	46—60	25—32	49—64	19—24	5

Notes:

a) One half of nitrogen, and all phosphorus, potassium, sulphur and cowdung should be applied in planting hole and thoroughly mixed with the soil.

b) Remaining nitrogen should be applied between 25-30 days after seeding followed by watering.

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INDIAN SPINACH
(PuiSak)
(Var. BARI PuiSak-1 and other varieties)

Table 1: High Yield Goal (Yield: 40 ± 4 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				OM (t/ha)
	N	P	K	S	
Optimum	0—30	0—6	0—20	0—5	—
Medium	31—60	7—12	21—40	6—10	4
Low	61—90	13—18	41—60	11—15	6
Very low	91—120	19—24	61—80	16—20	8

Table 2: Moderate Yield Goal (Yield: 32 ± 3.2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				OM (t/ha)
	N	P	K	S	
Optimum	0—21	0—4	0—14	0—3	—
Medium	22—42	5—8	15—28	4—6	3
Low	43—63	9—12	29—42	7—9	4.5
Very low	64—84	13—16	43—56	10—12	6

Notes for all yield goals

a) All cowdung/compost, phosphorus, sulphur, one half of nitrogen and potassium should be broadcast and incorporated during final land preparation.

b) Remaining nitrogen and potassium should be applied in two equal installments at 10 and 25 days after transplanting followed by irrigation (if moisture is insufficient).

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KANGKONG

(Gima Kalmi)

(Var: BARI Gima Kalmi-1)

Table 1: High Yield Goal (Yield: 40 ± 4 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				OM (t/ha)
	N	P	K	S	
Optimum	0—40	0—11	0—17	0—3	—
Medium	41—80	12—22	18—34	4—6	4
Low	81—120	23—33	35—51	7—9	6
Very low	121—160	34—44	52—68	10—12	8

Table 2: Moderate Yield Goal (Yield: 32 ± 3.2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				OM (t/ha)
	N	P	K	S	
Optimum	0—28	0—8	0—12	0—2	—
Medium	29—56	9—16	13—24	3—4	3
Low	57—84	17—24	25—36	5—6	4.5
Very low	85—112	25—32	37—48	7—8	6

Notes: For All Yield Goals

a) All cowdung, phosphorus, potassium, sulphur and one third nitrogen should be applied as broadcast and incorporated during final land preparation.

b) The remaining nitrogen should be top dressed after each harvest followed by irrigation (if moisture is insufficient).

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AMARANTHUS
(All varieties))

Table 1: High Yield Goal (Yield: 30 ± 3 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				OM (t/ha)
	N	P	K	S	
Optimum	0—39	0—9	0—20	0—2	1.5
Medium	40—78	10—18	21—40	3—4	3
Low	79—117	19—27	41—60	5—6	4.5
Very low	118—156	28—36	61—80	7—8	6

Table 2: Moderate Yield Goal (Yield: 24 ± 2.4 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				OM (t/ha)
	N	P	K	S	
Optimum	0—27	0—6	0—14	0—1.5	1
Medium	28—54	7—12	15—28	1.6—3.0	2
Low	55—81	13—18	29—42	3.1—4.5	3
Very low	82—108	19—24	43—56	4.6—6.0	4

Notes: For All Yield Goals

a) All cowdung/compost, phosphorus, potassium, sulphur and one half of nitrogen should be broadcast and incorporated during final land preparation.

b) Remaining nitrogen should be applied in two equal installments at 10 and 25 days after sowing/seeding followed by irrigation (if moisture is insufficient).

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RED AMARANTHUS

(Var. BARI Lal sak-1 and other varieties)

Table 1: High Yield Goal (Yield: 14 ± 1.4 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				CD/OM (t/ha)
	N	P	K	S	
Optimum	0—27	0—6	0—10	0—1.5	1
Medium	28—54	7—12	11—20	1.6—3.0	2
Low	55—81	13—18	21—30	3.1—4.5	3
Very low	82—108	19—24	31—40	4.6—6.0	4

Note: For All Yield Goals

a) All cowdung/compost, phosphorus, potassium and sulphur and one half of nitrogen should be broadcast and incorporated during final land preparation.

b) Remaining nitrogen should be applied at 20 DAS followed by irrigation (if moisture is insufficient).

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SPICE CROPS

ONION

(Var: BARI Piyaj-1, BARI Piyaj-2 and Taherpuri)

Table 1: High Yield Goal (Yield: 16.0 ± 1.6 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						CD/OM (t/ha)
	N	P	K	S	Zn	B	
Optimum	0—30	0—15	0—40	0—10	—	—	—
Medium	31—60	16—30	41—80	11—20	0—2.0	0—0.7	2
Low	61—90	31—45	81—120	21—30	2.1—3.0	0.71—1.4	3
Very low	91—120	46—60	121—160	31—40	3.1—4.0	1.41—2.0	4

Notes:

a) Half of nitrogen and potassium and all phosphorus, sulphur, zinc, boron and cowdung should be applied at the time of land preparation.

b) Remaining nitrogen and potash should be applied as top dressing at 25 and 50 DAT followed by irrigation.

SUMMER ONION

(Var. BARI Piyaj-2 and BARI Piyaz-3)

Table 1: High Yield Goal (Yield: 12.0 ± 1.2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						CD/OM (t/ha)
	N	P	K	S	Zn	B	
Optimum	0-21	0-10	0-20	0-10	-	-	—
Medium	22-42	11-20	21-40	11-20	0-1.4	0.1-0.6	2
Low	43-63	21-30	41-60	21-30	1.5-2.1	0.7-0.8	3
Very low	64-84	31-40	61-80	31-40	2.2-2.8	0.9-1.0	4

Notes:

a) Half of nitrogen and potassium and all phosphorus, sulphur, zinc, boron and cowdung should be applied at the time of land preparation.

b) Remaining nitrogen and potash should be applied as top dressing at 25 and 50 DAT followed by irrigation (if moisture is insufficient).

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GARLIC
(All varieties)

Table 1: High Yield Goal (Yield: 10.0 ± 1.0 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)					CD/OM (t/ha)
	N	P	K	S	Zn	
Optimum	0—30	0—15	0—40	0—10	—	—
Medium	31—60	16—30	41—80	11—20	0—2.0	2
Low	61—90	31—45	81—120	21—30	2.1—3.0	3
Very low	91—120	46—60	121—160	31—40	3.1—4.0	4

Notes:

a) Half of nitrogen and potassium and full of phosphorus, sulphur, zinc and cowdung should be applied at the time of final land preparation.

b) Remaining nitrogen and potash should be applied as top dressing at the time of first mulching followed by irrigation (if moisture is insufficient).

GINGER
(All varieties)

Table 1: High Yield Goal (Yield: 15.0 ± 1.5 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)					CD/OM (t/ha)
	N	P	K	S	Zn	
Optimum	0—40	0—15	0—40	0—5	—	—
Medium	41—80	16—30	41—80	6—10	0—2.0	2
Low	81—120	31—45	81—120	11—15	2.1—3.0	3
Very low	121—160	46—60	121—160	16—20	3.1—4.0	4

Notes:

a) Half of nitrogen and all phosphorus, potassium, sulphur, zinc and cowdung should be applied at the time of final land preparation.

b) Remaining nitrogen should be applied at 6 weeks after planting followed by irrigation.

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TURMERIC

(Var. Dimla, Sinduri and BARI Halud-3)

Table 1: High Yield Goal (Yield: 35.0 ± 3.5 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)					CD/OM (t/ha)
	N	P	K	S	Zn	
Optimum	0—40	0—12	0—35	0—5	—	—
Medium	41—80	13—24	36—70	6—10	0—2.0	2
Low	81—120	25—36	71—105	11—15	2.1—3.0	3
Very low	121—160	37—48	106—140	16—20	3.1—4.0	4

Notes:

a) Half of nitrogen and all phosphorus, potassium, sulphur, zinc and cowdung should be applied at the time of final land preparation.

b) Remaining nitrogen should be applied at 80 and 110 DAP followed by irrigation (depending on soil moisture).

CHILLI

(Var. BARI Marich-1 & other varieties)

Table 1: High Yield Goal (Dry Yield: 2.0 ± 0.2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)					CD/OM (t/ha)
	N	P	K	S	Zn	
Optimum	0—30	0—20	0—30	0—5	—	—
Medium	31—60	21—40	31—60	6—10	0—2.0	2
Low	61—90	41—60	61—90	11—15	2.1—3.0	3
Very low	91—120	61—80	91—120	16—20	3.1—4.0	4

Notes:

a) Half of nitrogen and all phosphorus, potassium, sulphur, zinc and cowdung should be applied at the time of final land preparation.

b) Remaining nitrogen should be top dressed at 25, 50 & 70 days after planting followed by irrigation (depending on oil moisture).

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CORIANDER
(Var: BARI Dhania-1)

Table 1: High Yield Goal (Yield: 2.0 ± 0.2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)					CD/OM (t/ha)
	N	P	K	S	Zn	
Optimum	0—30	0—12	0—20	0—5	—	—
Medium	31—60	13—24	21—40	6—10	0—2.0	2
Low	61—90	25—36	41—60	11—15	2.1—3.0	3
Very low	91—120	37—48	61—80	16—20	3.1—4.0	4

Notes:

a) Half of nitrogen and all phosphorus, potassium, sulphur, zinc and cowdung should be applied at the time of final land preparation.

b) The remaining nitrogen should be applied at 30 DAS followed by irrigation (depending on soil moisture).

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MAJOR FRUIT CROPS

BANANA

(Var. BARI Kola-1, BARI Kola-2 & others)

Table 1: Establishment and Fruiting Plants(Yield: 25 ± 2.5 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)						CD/OM (t/ha)
	N	P	K	S	Zn	B	
Optimum	0—45	0—10	0—43	0—16	—	—	2
Medium	46—90	11—20	44—86	17—32	0.0—0.6	0.0—0.6	4
Low	91—135	21—30	87—129	33—48	0.7—1.2	0.7—1.2	6
Very low	136—180	31—40	130—172	49—64	1.3—2.0	1.3—2.0	8

Notes:

a) When establishing the plantation, all cowdung, phosphorus and one half of potassium, sulphur, zinc and boron should be applied to the bottom of hole and covered with 5 cm soil before planting the sucker.

b) At three months after planting, one third of nitrogen should be applied around the sucker and covered lightly with soil.

c) Six months after planting, the remaining nitrogen, potassium, sulphur, zinc and boron should be applied around the sucker and covered lightly with soil.

d) Thereafter, the same levels of fertilizer nitrogen and potassium and one half the quantities of phosphorus and sulphur should be applied annually in two equal installments. One application should be made in March and other in September.

e) All fertilizer applied to the growing plants should be in a half circle on the side of the plant where the next producing plant will be located.

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PAPAYA
(Var: Shahi papaya & others varieties)

Yield : 7-8 ton/ha

Table 1: Fertilizer recommendation from planting to fruiting

Manure/ nutrient	Fertilizer doses/plant							
	Total	Basal (At planting)	1st top dressing	2nd top dressing	3rd top dressing	4th top dressing	5th top dressing	6th top dressing
FYM/ Cowdung/ Compost (kg)	10	10	-	-	-	-	-	-
N (g)	225	-	25	25	25	52	52	50
P (g)	100	100	-	-	-	-	-	-
K (g)	225	-	25	25	25	50	50	50
S (g)	43	43	-	-	-	-	-	-
Zn (g)	2.5	2.5	-	-	-	-	-	-
B (g)	4.0	4.0	-	-	-	-	-	-

Notes:

a) The basal dose should be applied during pit preparation.

b) The first top dressing of N and K should be applied when the seedlings have established preferably about 2 months after transplanting.

c) The rest of the N and K fertilizer should be applied at an interval of 45 days from the first top dressing.

d) N and K should be applied at the rate of 25 g per plant up to flowering and thereafter the doses of fertilizers should be doubled.

e) The application of fertilizer should be stopped two months before final harvest.

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PINEAPPLE

(Var: Giant kew, Honey queen, Ghorasal & others)

Table 1: High Yield Goal (Yield: 30 ± 3 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)					CD/OM (t/ha)
	N	P	K	S	Zn	
Optimum	0—75	0—28	0—75	0—10	—	2
Medium	76—150	29—54	76—150	11—20	0.0—1.3	4
Low	151—225	55—84	151—225	21—30	1.4—2.6	6
Very low	226—300	85—112	226—300	31—40	2.7—4.0	8

Table 2: Moderate Yield Goal (Yield: 24 ± 2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)					CD/OM (t/ha)
	N	P	K	S	Zn	
Optimum	0—55	0—20	0—55	0—7	—	1.5
Medium	56—110	21—40	56—110	8—14	0.0—1.0	3.0
Low	111—165	41—60	111—165	15—21	1.1—2.0	4.5
Very low	166—220	61—80	166—220	22—28	2.1—3.0	6.0

Notes: For All Yield Goals

a) All cowdung, phosphorus, sulphur and zinc should be applied as broadcast and incorporated during final land preparation.

b) One half of nitrogen and potassium should be side dressed and covered 3-4 months after planting.

c) Remaining nitrogen and potassium should be applied 7-8 months after planting as top dressing and covered.

d) Nitrogen and potassium should be applied in subsequent years in two equal installments.

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WATER MELON
(All varieties)

Table 1: High Yield Goal (Yield: 35 ± 3.5 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)					
	N	P	K	S	Zn	B
Optimum	0—33	0—11	0—27	0—10	—	—
Medium	34—66	12—22	28—54	11—20	0.0—0.6	0.0—0.6
Low	67—99	23—33	55—81	21—30	0.7—1.2	0.7—1.2
Very low	100—132	34—44	82—108	31—40	1.3—1.8	1.3—2.0

Table 2: Moderate Yield Goal (Yield: 28 ± 3 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)					
	N	P	K	S	Zn	B
Optimum	0—23	0—8	0—18	0—7	—	—
Medium	24—56	9—16	19—36	8—14	0.0—0.4	0.0—0.4
Low	57—69	17—24	37—54	15—21	0.5—0.8	0.5—0.8
Very low	70—92	25—32	55—72	22—28	0.9—1.2	0.9—1.2

Notes: For All Yield Goals

a) One half of nitrogen, and all phosphorus, potassium, sulphur, zinc and boron should be applied in the planting furrow and covered with 6 to 8 cm of soil before planting the seed.

b) One half of the remaining nitrogen ($1/4^{th}$ of total) should be applied 10 days after plant emergence. The remaining nitrogen should be applied about 30 days later. Both applications should be made 25—30 cm around the main stem.

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MANGO

(BARI Aam-1, BARI Aam-2, BARI Aam-3, BARI Aam-4 & others varieties)

Table 1: Fertilizer recommendation from planting to fruiting/plant

Manure/ nutrient	Before planting	Age of trees (Year)						
		0-1	2—4	5—7	8—10	11—15	16—20	>20
FYM/ Cowdung/ Compost (kg)	15-20	5-9	10—15	16—20	21—25	26—30	31—40	41—50
N (g)	0	46	115	230	345	460	690	920
P (g)	100	15	32	53	84	105	158	211
K (g)	125	25	50	100	125	175	200	250
S (g)	45	-	18	36	45	63	72	90
Zn (g)	12	-	3.6	3.6	5.4	5.4	7.2	9.0

Notes:

a) The whole amount of organic manure, phophorus, potassium, sulphur and zinc should be thoroughly mixed with soil and applied in the pit prior to planting.

b) Trees should be fertilized in two split doses, one half in June/July or immediately after harvesting of fruits and the other half in September—October in both young and old orchards followed by irrigation if there is no rain.

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JACKFRUIT
(All varieties)

Table 1: Fertilizer recommendation from planting to fruiting/plant

Manure/ nutrient	Before planting	Age of tree (Year)					
		0-1	2—4	5—7	8—10	11—15	>20
FYM/ Cowdung/ Compost (kg)	25-35	0—1	2—4	5—7	8—10	11—20	100
N (g)	0	20-30	30-40	40-50	50-60	60-75	920
P (g)	100	100	180	260	380	550	300
K (g)	125	60	100	150	200	250	500
S (g)	45	100	150	200	300	400	85

Notes:

a) The whole amount of organic manure, phosphorus, potassium and sulphur should be applied at the time of final pit preparation.

b) Nitrogen and potassium should be incorporated with the top soil around the tree in two equal installments one in April-May and another in September-October.

c) From second year to onward all the fertilizers should be applied around the tree in two equal installments one in April-May and another in September-October.

d) Sulphur should be applied in every alternate year.

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GUAVA

(Var: BARI Payara-1, BARI Payara-2, BARI Payara-3 & others)

Yield: 5 ton/ha

Table 1: Fertilizer recommendation from planting to fruiting/plant

Manure/ nutrient	Before planting	Year					
		1st	**2nd**	**3rd**	**4th**	**5th**	**6th and above**
FYM/ Cowdung/ Compost (kg)	10	10	10	15	20	25	25
N (g)	0	45	92	138	184	230	230
P (g)	50	50	50	50	50	100	100
K (g)	125	50	50	150	200	250	250
S (g)	27	5	7	9	11	13	15

Notes:

a) Before planting all the recommended cowdung, phosphorus, potassium and sulphur should be thoroughly mixed with soil and applied in the pit prior to planting.

b) Trees should be fertilized annually in a split application, one half of all fertilizer should be broadcast around the trees and lightly incorporated in March-April and remaining half of fertilizer should be similarly applied in September i.e at the end of rainy season.

LITCHI

(All varieties)

Table 1: Fertilizer recommendation from planting to fruiting/plant

Manure/ nutrient	Before planting	*Age of tree (Year)*						
		0-1	2-4	5-7	8-10	11-15	16-20	>20
FYM/ Cowdung/ Compost (kg)	20	10	10	15	20	30	40	50
N (g)	0	138	184	230	345	552	690	920
P (g)	120-140	—	100	150	300	400	500	700
K (g)	175-225	—	100	200	400	600	750	1000
S (g)	34-50	—	18	18	18	27	36	45
Zn	10	—	2.5	5.0	5.0	7.5	10.0	12.5

Notes:

a) Before planting all the recommended organic manure, phosphorus, potassium, sulfur and zinc should be thoroughly mixed with soil and applied in the pit.

b) Ten to twelve days later, trees can be transplanted.

c) Trees should be fertilized annually in a split application; one half of all fertilizer should be broadcast around the trees and lightly incorporated in March. Remaining half of fertilizer should be similarly applied in September i.e at the end of rainy season.

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CITRUS
(Oranges and Pomelo)

Table 1: Before planting

Soil Analysis Interpretation	Fertilizer Recommendation (g/pit)						OM (kg/pit)
	N	P	K	S	Zn	B	
Optimum	0—26	0—5	0—19	0—13	0—2	—	1
Medium	27—52	6—10	20—38	14—26	3—4	0.0—0.6	2
Low	53—78	11—15	39—57	27—39	5—6	0.7—1.2	3
Very low	79—104	16—20	58—76	4.0—52	7—8	1.3—2.0	4

Table 2: Plants (3—5 years old)

Soil Analysis Interpretation	Fertilizer Recommendation (g/plant)						OM (kg/plant)
	N	P	K	S	Zn	B	
Optimum	0—37	0—9	0—19	0—2	—	—	0.5
Medium	38—74	10—18	20—38	3—4	0.0—0.6	0.0—0.6	1.0
Low	75—111	19—27	39—57	5—6	0.7—1.2	0.7—1.3	1.5
Very low	112—148	28—36	58—76	7—8	1.3—2.0	1.3—2.0	2.0

Table 3: Plants (6—10 years old)

Soil Analysis Interpretation	Fertilizer Recommendation (g/plant)						OM (kg/plant)
	N	P	K	S	Zn	B	
Optimum	0—42	0—24	0—51	0—3	—	—	0.5
Medium	43—84	25—48	52—102	4—6	0—1.3	0.0—0.6	1.0
Low	85—112	49—72	103—153	7—9	1.4—2.6	0.7—1.2	1.5
Very low	127—168	73—96	154—204	10—12	2.7—4.0	1.3—2.0	2.0

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Table 4: Plants (above 10 years old)

Soil Analysis Interpretation	Fertilizer Recommendation (g/plant)						OM (kg/plant)
	N	P	K	S	Zn	B	
Optimum	0—83	0—27	0—54	0—68	—	—	0.5
Medium	84—166	28—54	55—108	69—136	0.0—1.3	0.0—0.6	1.0
Low	167—249	55—81	109—162	137—204	1.4—2.6	0.7—1.2	1.5
Very low	250—332	82—108	163—216	205—272	2.7—4.0	1.3—2.0	2.0

Notes:

a) Before planting all the recommended organic manure, phosphorus, potassium, sulphur, zinc and boron should be thoroughly mixed with soil and applied in the pit prior to planting.

b) Trees should be fertilized annually in three equal splits application in February-March, April-May and September-October.

c) For lime and lemon, the doses recommended in the tables 2—4 may be reduced by 50 percent.

d) In acid soils, 500 grams of lime should be applied per tree every 3 years.

e) Citrus plants often suffer from the deficiency of iron and copper, the latter is associated with die back. It is desirable to apply foliar sprays of ferrous sulphate and copper sulphate to the trees once or twice every year.

f) Zinc should be applied where the soil is known to have this element deficiency.

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SOME INDIGENOUS FRUITS

GOLDEN APPLE

Table –1: Fertilizer recommendation per pit

Name	Amount per pit
Phosphorus	50 g
Potassium	125 g
Cowdung	10-15 kg

Notes:

After plantation of the seedling each plant should receive 46 g nitrogen, 20 g phosphorus, 50 g potassium each year. Fertilizer should be increased by 10 % each year after the first year of plantation. A full grown plant should receive 460 g nitrogen, 160 g phosphorus 300 g potassium and 10-15 kg cowdung before and after monsoon.

SAPOTA

Table –1: Fertilizer recommendation per pit

Name	Amount per pit
Phosphorus	50 g
Potassium	125 g
Cowdung	15 kg

Table –2: Fertilizer recommendation per plant each year

Name	Amount per plant
Nitrogen	345-390 g
Phosphorus	70-90 g
Potassium	350-400 g
Cowdung	35-45 kg

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CARAMBOLA

Table –1: Fertilizer recommendation per pit

Name	***Amount per pit***
Phosphorus	50 g
Potassium	125 g
Cowdung	15-20 kg

Table –2: Fertilizer recommendation per plant each year

Name	***Amount per pit***
Nitrogen	230-460 g
Phosphorus	60-100 g
Potassium	250-500 g
Cowdung	40-50 kg

BLACK BERRY (Jamun)

Table –1: Fertilizer recommendation per pit

Name	***Amount per pit***
Phosphorus	50 g
Ash	4-5 kg
Organic Fertilizer	15-20 kg

Table –2: Fertilizer recommendation per full grown plant each year

Name	***Amount per pit***
Nitrogen	460 g
Phosphorus	160 g
Potassium	350 g
Cowdung	40-50 kg

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PLANTATION CROPS
SUGARCANE
(All varieties)

Table 1: High Yield Goal (Yield: 100 ± 10 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)					
	N	P	K	S	Mg*	Zn
Optimum	0—55	0—18	0—60	0—15	0—10	—
Medium	56—110	19—36	61—120	16—30	11—20	0.0—2.6
Low	111—165	37—54	121—180	31—45	21—30	2.7—5.2
Very low	166—220	55—72	181—240	46—60	31—40	5.3—8.0

Table 2: Moderate Yield Goal (Yield: 80 ± 8.0 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)					
	N	P	K	S	Mg*	Zn
Optimum	0—40	0—12	0—50	0—10	0—8	—
Medium	41—80	13—24	51—100	11—20	9—16	0—2.0
Low	81—120	25—36	101—150	21—30	17—24	2.1—4.0
Very low	121—160	37—48	151—212	31—40	25—32	4.1—6.0

* Only in Mg deficient areas

Notes: For All Yield Goals

a) For heavy textured soils one half of nitrogen and potassium and all phosphorus, sulphur and zinc should be applied in trenches and thoroughly mixed with the soil by spade or hoe, prior to planting of sugarcane. Zinc and phosphorus should not be mixed together and applied at a time. The remaining nitrogen and potassium should be applied as top dressing at tillering stage (120-150 days)

b) On light textured soils one third of nitrogen and one half of potassium and all phosphorus, sulphur and zinc should be applied in trenches and thoroughly mixed with the soil by spade or hoe prior to planting of sugarcane. Remaining potassium and one third nitrogen should be applied as top dressing at tillering stage (120-150 days). The rest one third nitrogen should be top dressed after completion of tillering (about 180 days).

c) For transplanted sugarcane top dressing of nitrogen and potassium in both of above cases (a and b) are done only if rain is available to make soil moisture adequate. If soil is dry, top dressing should be delayed until there is sufficient rainfall.

d) For transplanted sugarcane basal nitrogen and potassium should be applied 20-30 days after transplanting of sugarcane settling.

e) For ratoon cane additional 40 kg nitrogen/ha to be applied. All other nutrients to be the same as plant cane.

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TOBACCO
(Var: Sesmeria)

Table 1: High Yield Goal (Yield: 2.5 ± 0.3 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0—20	0—11	0—27	0—4	—
Medium	21—40	12—22	28—54	5—8	0.0—0.6
Low	41—60	23—33	55—81	9—12	0.7—1.2
Very low	61—80	34—44	82—108	13—14	1.3—2.0

Table 2: Moderate Yield Goal (Yield: 2.0 ± 0.2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				
	N	P	K	S	Zn
Optimum	0—14	0—8	0—19	0—3	—
Medium	15—28	9—16	20—38	4—6	0—0.6
Low	29—42	17—24	39—57	7—9	0.7—1.2
Very low	43—56	25—32	58—76	10—12	1.3—2.0

Notes: For All Yield Goals

a) All phosphorus, potassium, zinc and two thirds nitrogen should be applied at the time of final land preparation in a band 5-7 cm below and 5-7 cm to the side of the transplanted plants.

b) Remaining nitrogen should be applied at 30 days after transplanting.

c) Potassium should be in the form of K_2SO_4 and not as muriate of potash. No further sulphur will be necessary.

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TEA
(All varieties)

Table 1. Young tea

Age of the plants (year)	Fertilizer Recommendation (kg/ha)			Cowdung/ Compost
	N	P	K	
1st	80	40	80	1 kg/plant
2nd	90	45	90	1 kg/plant
3rd	120	40	80	5 ton/ha
4th	135	45	90	5 ton/ha
5th	150	50	100	5 ton/ha

Notes:

a) The application of fertilizer should be made after six months of planting.

b) The ideal time of fertilizer application is considered when the soil is sufficiently moist, usually after a good shower. Thus, the month of April may be an ideal time for the 1st split of application.

Table 2. Mature tea*

Yield (kg/ha)	Fertilizer Recommendation (kg/ha)			
	N	P	K	Zn
Up to 1000	50	4.5	25	-
1001-2000	51-1000	4.6-9.0	26-50	3.6
2001-3000	101-160	9.1-13.5	51-75	3.7-5.4

*The fertilizer recommendation has been made on the basis of production of made tea in kg/ha

Notes:

a) The ideal time of fertilizer application is considered when the soil is sufficiently moist, usually after a good shower. All phosphorus, zinc and half of nitrogen and potassium should be applied as 1st split in April.

b) Remaining amount of nitrogen and potassium should be applied as 2nd split and must be completed by the last week of July or 1st week of August depending on the climatic condition or this amount may be applied as foliar spray in 10 equal doses between mid July and early December.

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c) As a source of nitrogen, $(NH_4)_2SO_4$ is generally used in tea cultivation, if it is not mentioned otherwise, P and K are taken from TSP and MP respectively.

d) Foliar spray with urea @ 4.5 kg in 450 litres of water per hectare is beneficial to encourage growth in the field. Spraying may, however, be restricted to 3-4 times a year.

e) Application of zinc at the early stage encourages vegetative growth. Zinc fertilizer may be applied at the time of usual fertilizer application in soil.

f) The same amount of zinc may be applied as foliar spray in 10 split doses. It may be mentioned that zinc sulphate may be used for soil and foliar application but chelamin is best for foliar sprays.

g) If soil pH is below 5.0, dolomite [$(CaMg(CO_3)_2$] application is suggested, usually after a good shower of rain.

Nucleus Clone Plot :

The tea plants which are nourished for vegetable cuttings, fertilized with NPK, recommended as follows.

Table 3. Fertilizer recommendation for Nucleus Clone Plot

Age of the plant (year)	NPK ratio	Mixture (g/bush)	Fertilizer mixture (kg/ha)		Method of application
			Planting spacing		
			Square	Triangular	
			6944 bushes/ha	8019 bushes/ha	
1	2:1:2	30	208	240	Ring
2	2:1:2	50	347	400	Ring
3	2:1:2	70	485	560	Ring
4	2:1:2	-	530	530	Ring
Onwards	-	-	-	-	Broadcasting

Notes:

a) The fertilizer is applied in two equal splits yearly

b) The rate of N is 90 kg in 1^{st}-3^{rd} year; 4^{th} year onwards rate of N is 100 kg.

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Seed Bari :

A seed garden is popularly known as seed bari and the plants are not plucked. The plants are reared for collection of tea seeds.

Table 4: Fertilizer recommendation for Seed-Bari/plant

Age of plant	Cowdung (kg)	Oilcake (kg)	Ammonium sulphate(g)	Triple super phosphate(g)	Muriate of potash(g)
1	5	0.5	100	50	50
2	5	0.5	200	100	100
3	10	1.0	300	300	300
4	10	1.0	400	400	400
Onwards	10	1.0	500	500	500

Notes: The mode and method of application of fertilizers are similar to that of nucleus clone plants as described in Table-3.

Hasan

COCONUT
(All varieties)

Table 1: Fertilizer recommendation at planting

kg/pit				
N	P	K	OM	Common Salt
0.1-0.125	0.05	0.125	25	0.5

Notes:

a) All the recommended organic manure, phosphorus, potassium and common salt should be mixed thoroughly with the soil of the pit and applied prior to planting.

b) Common salt is optional.

c) Better results will be obtained if 4-5 kg of ash are applied instead of chemical potassium fertilizer.

d) Nitrogen should be applied after 15 days of planting.

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Table 2: Moderate Yield Goals in Bearing Trees

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)					
	N	P	K	S	Zn	B
Optimum	0—100	0—30	0—200	0—10	—	0—0.5
Medium	101—200	31—50	201—300	11—20	0—0.6	0.6—1.0
Low	201—300	51—70	301—400	21—30	0.7—1.2	1.1—1.5
Very low	301—400	71—90	401—500	31—40	1.3—2.0	1.6—2.0

Notes:

a) The recommended fertilizers should be applied in two equal installments, preferably in February-March and September-October. These should be mixed with the soil around the base of the tree over a radius of 2-3 meters.

b) If available, 30 kg of cowdung/compost should be applied per tree per year.

c) In acid soils, one kg of lime should be applied per tree every 3 years. Dolomite which contains both calcium and magnesium is preferable to lime, because coconut is a magnesium loving plant.

d) Severe drop and sterility of nuts/buttom in coconut are associated with a deficiency of potassium and boron.

e) Prolonged drought reduces the yield of coconut severely. In order to get desired benefits from the application of fertilizers the trees should be irrigated during the dry season.

f) At the pre-bearing stage, the dose of fertilizers should be determined according to the age of the tree. In the second year of planting, about 25% of the N,P and K dose recommended above is likely to be sufficient. It should be increased by 10% of the full dose every year.

g) Zinc should be applied only in soils known to have deficiency. Boron is essential for bearing trees.

Hasan

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BETELNUT
(All varieties)

Table 1: Average Yield Goal (Yield: 2.0± 0.2 t/ha)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)			
	N	P	K	S
Optimum	0—15	0—4	0—5	0—2
Medium	16—30	5—8	6—10	2.1—4
Low	31—45	9—12	11—15	4.1—6
Very low	46—60	13—16	16—20	6.1—8

Note:

All fertilizers should be mixed with soil of pit and applied before two weeks of transplanting.

BETEL LEAF
(All Varieties)

Table 1: Average Yield Goal (Yield: 3.5— 6.0 t/ha/Yr)

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)				**Oilcake** (t/ha)
	N	P	K	S	
Optimum	0—20	0—15	0—15	0—5	4
Medium	21—40	16—30	16—30	6—10	6
Low	41—60	31—45	31—45	11—15	8
Very low	61—80	46—60	46—60	16—20	10

Notes:

a) At the time of final land preparation, 1000-1500 kg/ha of oiltake and all phosphorus, potassium and sulphur should be applied.

b) After 30-40 days of planting, the remaining oilcake should be applied at 15-20 days interval in rows until the vine grows upto 1-1.5 meter in length.

c) Nitrogen should be applied in 3 equal installments before the monsoon rains, in September and December.

d) Afeter one year, all fertilizers should be applied in 3 equal instalments before the monsoon rains, in September and December.

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RUBBER
(All varieties)

Table 1: Young trees

Soil Analysis Interpretation	Fertilizer Recommendation (kg/ha)			
	N	P	K	S
Optimum	0—50	0—20	0—65	0—10
Medium	51—100	21—40	66—130	11—20
Low	101—150	41—60	131—195	21—30
Very low	151—200	61—80	196—260	31—40

Note:

All fertilizers should be applied in three equal splits in March, June and September around the tree starting about 20-30 cm from the tree base but remaining under the leaf canopy.

Hasan

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10.2 Use of Upazila Nirdeshika for making location specific fertilizer recommendations

Location specific balanced dose of fertilizer recommendation for different crops using Upazila Nirdeshika can be made in three different ways. These are

Upazila wise average soil test value
Mapping unit wise average soil test value
Location specific soil test value

Steps for making fertilizer recommendations using upazila nirdeshika

Methodologies for calculation of balanced doses of fertilizers based on mapping unit or upazila wise average soil test value are:

1. Identification of land type-wise soil groups

Steps for identification of land type-wise soil groups using Upazila Nirdeshika are given below:

Step-i :	Consult upazila soil and land type map
Step-ii :	Identify the Union following Union boundary provided in the Soil and Land Type Map
Step-iii :	Identify your plot(s) in the mapping unit(s) present in that particular union
Step-iv :	Note down soil group(s) in each mapping unit consulting upazila soil and land type map
Step-v:	Identify the land type consulting Annexure-8 of the Upazila Nirdeshika.
Step-vi:	For confirmation with your identified soil group(s) you may dig out the soil with the help a of spade or an auger and note down the colour, texture, consistency, pH and drainage class of the soil

2. Collect land type and soil group wise average analytical soil test values (results) from Annexure-2 of the Nirdeshika.
3. Select suitable crop and cropping pattern of your area/location
4. Calculate appropriate doses of fertilizer for different crops on the basis of average soil test value and the procedure as described in the Appendix-9 of the FRG 2005.
5. Calculate appropriate doses of fertilizers for different cropping patterns consulting rationales as described in the chapter 6.3 of the FRG 2005.
6. Methods of fertilizer application for the desired crop are given in the chapter 10.1 of the FRG 2005.

For example, land type and soil group are identified using Gazipur Sadar Upazila Nirdeshika. The land type is high land and the soil group is Chandra and the content of N = 0.11%, P = 6.41 µg/g soil, K = 0.15 m.e/100g soil, and S = 23.29 µg/g soil.

If farmers existing cropping pattern under irrigated condition is Wheat-T.aus-T.aman, we should calculate balanced fertilizer dose for wheat (high yield goal, 4.0-5.0 t/ha), T.Aus (high yield goal, 3.6-4.4 t/ha) and T.Aman rice (high yield goal, 4.5-5.5 t/ha) based on soil test value and the procedure as described in the Appendix-9 of the FRG 2005. In calculating fertilizer dose for the cropping pattern, rationales (chapter 6.3 of FRG 2005) need to be followed.

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10.3 Fertilizer recommendation for cropping patterns under different AEZs

The most efficient and economic use of chemical fertilizers and organic manures requires a knowledge of the basic data on the soil, climate and the crops. The useful soil related data include pH, texture, organic matter content and some other soil properties. The requirements for nutrients of a particular crop depend on the overall environmental conditions as well as the yield potential of the crop in question. The more the climate and the physical conditions of the soil are favourable for crop growth, the higher will be the need for nutrients. High yielding varieties require more nutrients than the traditional (local) varieties. Utilization of the applied nutrients thus depends on the cropping system, efficiency of crop management and time and method of application of the fertilizers. The processes through which the applied nutrients are lost (leaching, volatilization, denitrification etc) and the immobilized should be kept in mind at the time of preparing schedules for the application of fertilizers to different crops in the patterns.

In this section, important data required for determining fertilizer doses in the different agro-ecological zones of the country, namely, the major cropping patterns, land type, soil type, pH, organic matter content and K bearing minerals have been furnished. In all cases the rabi crops have been assumed to be the first crops of the patterns. Since the fertilizer recommendations are not based on location specific soil test, only moderate yield goals are intended and the suggested fertilizer doses are not absolute but only indicative and subject to variations as situations demand. It is expected that the local officials will use their judgement while making decisions on fertilizer doses for each crops of the patterns in the light of the factors that affect the requirement and utilization of the applied nutrients as mentioned in the above paragraph. The residual effect of P, K, S and Zn should specially be taken into consideration also, as mentioned in section 6.3.

Hasan

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AEZ 1 : OLD HIMALAYAN PIEDMONTPLAIN

LAND TYPES

Highland	- 58%
Medium Highland	- 34%
Medium Lowland	- 1%
Homestead + Water	- 7%

LOCATION AND EXTENTS:
Most of Panchaagarh and Thakurgaon districts and north-western parts of Dinajpur districts.
3982 km² (398154 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Highland	**Rainfed**										
O.M: Low to Medium	Rabi	Wheat	2.5±0.25	45	10	36	5	3	1.0	1.0	-
pH: 4.0-6.0	Kharif-I	Jute(O)/	3.5±0.35	75	7	50	5	-	-	-	-
Texture: Sandy Loam		B.Aus (LIV)	2.5±0.25	30	5	21	2	-	-	-	-
K-bearing minerals: Low	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Wheat	2.5±0.25	45	10	36	3	2	-	1.0	-
	Kharif-I	Millet (Kaon)	2.5±0.25	45	8	26	2	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	35	6	-	1.0	-	-
	Rabi	Potato	20.0±2.0	70	12	70	6	4	2.5	0.5	-
	Kharif-I	Jute(O)	3.5±0.35	75	7	33	5	-	-	-	-
	Kharif-2	T.Aman (MV)/	4.0±0.4	66	5	22	6	-	1.0	-	-
		T.Aman (LIV)	3.0±0.3	45	4	18	6	-	1.0	-	-
	Rabi	Radish/	31.0±3.1	75	18	75	9	-	1.0	-	1
		Cabbage/	52±5.2	90	36	30	12	-	2.5	0.5	1
		Cauliflower/	18±1.8	60	21	65	10	-	1.5	0.5	1
		Lady's finger	8.0±0.0	45	12	30	6	-	1.0	0.5	-
	Kharif-1	Brinjal	34.0±3.4	60	12	25	6	-	-	-	-
	Kharif-II	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Sesame	1.0±0.1	54	15	33	10	-	-	-	-
	Kharif-2	T.Aman (MV)/	4.0±0.4	66	5	35	6	-	1.0	-	-
		T.Aman (LIV)	3.0±0.	45	4	28	6	-	1.0	-	-
	Rabi	Chilli	1.3±0.13	65	28	65	10	5	2.5	1.0	-
	Kharif-1	Jute(0)	3.5±0.35	75	7	33	5	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	4	18	6	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Mungbean	1.2±0.12	15	18	30	10	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	35	6	-	1.0	-	-
	Rabi	Sugarcane	70±0.70	110	30	120	25	20	2.5	2.0	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Irrigated										
	Rabi	Sugarcane	82.0±8.2	125	35	130	25	30	2.5	2	-
	Rabi	Sugarcane+	82.0±8.2	125	35	130	25	30	2.5	2	-
		Potato	10.0±1.0	30	12	45	5	-	-	-	-
	Rabi	Sugarcane+	82.0±8.2	125	35	130	25	30	2.5	2	-
		Onion/	8.0±0.8	45	15	60	10	-	-	-	-
		Garlic	5.0±0.5	35	15	45	10	-	-	-	-
	Rabi	Sugarcane+	82.0±8.2	125	35	130	25	30	2.5	2	-
		Mungbean	0.7±0.07	7	10	5	5	-	-	-	-
	Rabi	Boro (MV)	4.8±0.5	96	10	54	6	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	23	6	-	0.5	-	-
	Rabi	Boro (MV)	4.8±0.5	96	10	54	6	-	1.0	-	-
	Kharif-I	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	40	5	23	6	-	0.5	-	-
	Rabi	Wheat	3.5±0.35	90	15	75	4	4	-	1.0	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	23	6	-	1.0	-	-
	Rabi	Wheat	3.5±0.35	90	15	75	4	4	-	1.0	-
	Kharif-I	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	40	5	23	6	-	1.0	-	-
	Rabi	Wheat	3.5±0.35	90	15	75	4	4	-	1.0	-
	Kharif-1	T.Aus	3.2±0.32	55	5	18	4	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	23	6	-	1.0	-	-
	Rabi	Maize	8.0±0.8	196	37	112	25	12	3.0	1.0	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	22	6	-	1.0	-	-
	Rabi	Potato	25±2.5	96	16	96	8	6	2.0	0.5	-
	Kharif-1	T.Aus	3.2±0.32	55	5	18	4	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	22	6	-	1.0	-	-
Land Type : Medium Highland O.M: Low pH 4.0-6.5 Texture: Loamy K-mearing minerals: Low	**Rainfed**										
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	B.Aus (LIV)	2.5±0.25	30	6	21	4	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	4	23	6	-	1.0	-	-
	Rabi	Wheat	2.5±0.25	45	10	36	3	2	-	1.0	
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	4	28	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	5	35	6	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Wheat	2.5±0.25	45	10	36	3	2	-	1.0	-
	Kharif-I	Jute(0)	3.5±0.35	75	7	50	5	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	4	28	6	-	1.0	-	-
	Rabi	Potato	20±2.0	70	12	70	6	4	2.5	0.5	-
	Kharif-I	Jute(0)	3.5±0.35	75	7	33	5	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	4	18	6	-	-	-	-
		T.Aman (MV)	4.0±0.4	66	5	22	6	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Kaon	2.5±0.25	45	12	30	5	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	4	28	6	-	-	-	-
		T.Aman (MV)	4.0±0.4	66	5	35	6	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Jute(0)	3.5±0.35	75	10	58	10	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	4	21	6	-	1.0	-	-
	Irrigated										
	Rabi	Mustard (LIV)	1.2±0.1	54	12	45	8	3.5	-	1	-
		Boro (MV)	4.8±0.5	96	7	46	6	-	-	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	23	6	-	1.0	-	-
	Rabi	Boro (MV)	4.8±0.5	96	10	54	6	-	1.0	-	-
	Kharif-1	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	40	5	23	6	-	0.5	-	-
	Rabi	Wheat	3.5±0.35	90	16	75	4	4	-	1.0	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	23	6	-	1.0	-	-
	Rabi	Wheat	3.5±0.35	90	16	75	4	4	-	1.0	-
	Kharif-1	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	40	5	23	6	-	1.0	-	-
	Rabi	Wheat	3.5±0.35	90	16	75	4	4	-	1.0	-
	Kharif-1	Jute(0)	3.5±0.35	75	7	50	5	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	23	6	-	1.0	-	-
	Rabi	Maize	8.0±0.8	196	37	112	25	12	3.0	1.0	-
	Kharif-1	Fellow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	23	6	-	1.0	-	-

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AEZ 2 : ACTIVE TISTA FLOODPLAIN

LAND TYPES

Highland	- 2%
Medium Highland	- 72%
Moesteads + water	- 26%

LOCATION AND EXTENTS:

The region occupies narrow belts within and adjoining the channels rivers in Nilphamarim, Rangpur, Lalmonibat, Kurigram and Gaibandha Districts
836 km^2(83644 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Medium Highland O.M.: Low pH: 5.2-6.9 Texture: Sandy Loam K-bearing minerals: Medium	**Rainfed**										
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-I	B.Aus (LIV)	2.5+0.25	30	8	14	5	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0+0.3	45	4	19	6	-	1.0	-	-
		T.Aman (MV)	4.0+0.4	66	6	22	6	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Jute(0)	3.5+0.35	75	13	33	7	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0+0.3	45	4	19	6	-	1.0	-	-
		T.Aman (MV)	4.0+0.4	66	6	22	7	-	1.0	-	-
	Rabi	Wheat	2.5±0.25	45	14	24	3	2	-	1.5	-
	Kharif-1	Jute(0)	3.3±0.35	75	7	33	3	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0+0.3	45	4	19	6	-	1.0	-	-
		T.Aman (MV)	4.0+0.4	66	6	22	6	-	1.0	-	-
	Rabi	Groundnut	2.0+0.2	34	25	35	18	-	-	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0+0.3	45	4	19	6	-	1.0	-	-
	Rabi	Grasspea	1.0±0.1	12	8	8	5	-	-	0.5	-
	Kharif-1	B.Aus (LIV)	3.0+0.3	30	4	14	5	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0+0.4	66	6	22	6	-	1.0	-	-
	Rabi	Tobacco	2.0±0.2	42	20	38	8	-	1.0	-	-
	Kharif-1	Jute (0)	3.5±0.35	75	7	33	3	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0+0.4	66	6	17	6	-	1.0	-	-
	Rabi	Chilli	1.3±0.13	65	36	43	13	5	1.0	0.5	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0+0.3	45	4	14	6	-	1.0	-	-
		T.Aman (MV)	4.0+0.4	66	6	17	6	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Kaon	2.5±0.25	45	15	20	5	-	-	-	-
	Kharif-2	T.Aman(LIV)	3.0±0.3	45	4	19	6	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Medium Highland O.M: Low pH.5.2-6.9 Texture: Sandy Loam K-bearing minerals: Medium	**Irrigated**										
	Rabi	Boro (MV)	4.8±0.5	96	13	36	8	-	1.0	-	-
	Kharif-I	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0+0.4	66	6	22	6	-	1.0	-	-
	Rabi	Boro (MV)	4.8±0.5	96	13	36	8	-	1.0	-	-
	Kharif-I	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0+0.4	40	6	22	6	-	1.0	-	-
	Rabi	Wheat	3.5+0.35	90	20	50	5	-	-	1.0	-
	Kharif-I	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0+0.4	66	6	22	6	-	1.0	-	-
	Rabi	Maize	8.0+0.8	196	36	75	30	10	2.0	1.0	-
	Kharif-I	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0+0.4	66	6	17	8	-	1.0	-	-
	Rabi	Potato	25.0+2.5	96	20	65	10	5	2.0	1.0	-
	Kharif-I	Maize/	5.0+0.5	105	20	33	18	4	1.0	1.0	-
		T.Aus (MV)	3.2+0.32	54	4	14	6	-	1.0	-	-
	Kharif-2	T.Aman (MV)	4.0+0.4	66	6	17	8	-	1.0	-	-
	Rabi	Potato	25.0±2.5	96	20	65	10	5	2.0	1.0	-
	Kharif-1	Jute(0)	3.5±0.35	75	7	25	7	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0+0.3	45	4	20	6	-	1.0	-	-
		T.Aman (MV)	4.0+0.4	66	6	22	7	-	1.0	-	-
	Rabi	Tobacco	2.0±0.2	42	20	38	8	-	-	-	-
	Kharif-I	Jute(0)	3.5±0.35	75	7	25	7	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0+0.3	45	4	20	6	-	1.0	-	-
		T.Aman (MV)	4.0+0.4	66	6	22	6	-	1.0	-	-
	Rabi	Mustard	1.2±0.1	54	15	30	10	-	-	1.0	-
		Boro (MV)	4.8±0.5	96	7	32	8	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0+0.3	45	4	20	6	-	1.0	-	-
		T.Aman (MV)	4.0+0.4	66	6	22	6	-	1.0	-	-

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AEZ 3 : TISTA MEANDER FLOODPLAIN

LAND TYPES

Highland	- 35%
Medium Highland	- 51%
Medium Lowland	- 4%
Lowland	-1%
Homesteads + Water	-7%

LOCATION AND EXTENTS:

Most of greater Rangpur, eastern part of Panchagarh and Dinajpur nortern Bogra and part of Jaipurhat, Noagaon and Rajshahi Districts
9468 km^2 (946803 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type:	**Rainfed**										
Highland	Rabi	Cabbage/	52±5.2	90	36	20	15	10	2.0	0.5	0.5
O.M.:Low		Cauliflower	18±1.8	60	22	42	9	10	1.0	0.5	0.5
pH: 4.6-6.5	Kharif-1	Jute(0)	3.5±0.35	75	5	25	6	-	-	-	-
Texture: Loamy	Kharif-2	Fallow/	-	-	-	-	-	-	-	-	-
K-bearing		Blackgram	1.0±0.1	12	5	9	6	-	-	0.5	0.5
minerals:	Rabi	Wheat	2.5±0.25	45	10	24	3	2	-	1.5	-
Medium.	Kharif-I	Jute(0)	3.5±0.35	75	5	33	6	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	4	20	8	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	4	22	8	-	1.0	-	-
	Rabi	Potato	20±0.2	68	12	45	8	4	1.5	0.5	-
	Kharif-I	Jute(0)	3.5±0.35	75	5	25	5	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	4	14	8	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	4	16	8	-	1.0	-	-
	Rabi	Potato	20±0.2	68	12	45	8	4	1.5	0.5	-
	Kharif-I	Pointed gourd	23.0±2.3	45	20	40	10	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Groundnut	2.0±0.2	33	20	36	18	4	-	0.5	0.2
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	4	20	8	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	4	22	8	-	1.0	-	-
	Rabi	Onion/	10.0±1.0	65	22	58	18	5	2.0	1.0	-
		Garlic	10.0±1.0	65	22	58	18	5	2.0	1.0	-
	Kharif-I	Jute(0)	3.5±0.35	75	5	25	5	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Jute (0)	3.5±0.35	75	10	33	6	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.30	45	4	20	8	-	1.0	-	-
	Rabi	Sugarcane	80.0±8.0	120	25	100	25	12	2.5	1.0	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Irrigated											
Rabi	Boro (MV)		6.0±0.6	120	14	46	10	-	1.5	-	-
Kharif-I	Fallow		-	-	-	-	-	-	-	-	-
Kharif-2	T.Aman (MV)		4.0±0.4	66	4	22	8	-	1.0	-	-
Rabi	Mustard		1.2±0.1	54	12	30	10	3.5	-	1.0	-
	Boro (MV)		4.8±0.5	96	6	32	8	-	1.0	-	-
Kharif-1	Fallow		-	-	-	-	-	-	-	-	-
Kharif-2	T.Aman (MV)		4.0±0.4	66	4	22	8	-	1.0	-	-
Rabi	Wheat		3.5±0.35	90	16	50	5	4	-	1.0	-
Kharif-1	Fallow		-	-	-	-	-	-	-	-	-
Kharif-2	T.Aman (MV)		4.0±0.4	66	4	22	8	-	1.0	-	-
Rabi	Wheat		3.5±0.35	90	16	50	5	4	-	1.0	-
Kharif-1	Jute (0)		3.5±0.35	75	5	33	6	-	-	-	-
Kharif-2	Fallow/		-	-	-	-	-	-	-	-	-
	T.Aman (MV)		4.0±0.4	66	4	22	8	-	1.0	-	-
Rabi	Maize		8.0±0.8	196	36	75	30	3	3.0	1.0	-
Kharif-1	Lady's finger		12.0±1.2	63	8	20	5	-	-	0.5	-
Kharif-2	Fallow		-	-	-	-	-	-	-	-	-
Rabi	Maize		8.0±0.8	196	36	75	30	3	3.0	1.0	-
Kharif-1	Fallow/		-	-	-	-	-	-	-	-	-
Kharif-2	T.Aman (MV)		4.0±0.4	66	4	16	8	-	1.0	-	-
Rabi	Potato		25±2.5	96	16	64	10	6	2.5	1	-
Kharif-1	Jute (0)		3.5±0.35	75	5	25	5	-	-	-	-
Kharif-2	Fallow		-	-	-	-	-	-	-	-	-
Rabi	Potato		25±2.5	96	16	64	10	6	1.5	1	-
Kharif-1	Fallow/		-	-	-	-	-	-	-	-	-
Kharif-2	T.Aman (LIV)		3.0±0.3	45	4	14	8	-	1.0	-	-
Rabi	Potato		25±2.5	96	16	64	10	6	1.5	1	-
	Boro (MV)		4.8±0.5	96	6	23	8	-	-	-	-
Kharif-1	Fallow/		-	-	-	-	-	-	-	-	-
Kharif-2	T.Aman (MV)		3.5±0.4	66	4	16	8	-	1.0	-	-
Rabi	Potato		25±2.5	96	16	64	10	6	1.5	1	-
Kharif-1	Jute (0)		3.5 ±0.35	75	5	25	5	-		-	-
Kharif-2	T.Aman (MV)		4.0±0.4	66	4	16	8	-	1.0	-	-
Rabi	Sugarcane		82.0±8.2	125	35	100	25	30	2.5	2	-
Rabi	Sugarcane+		82.0±8.2	125	35	100	25	30	2.5	2	-
	Potato		10.0±1.0	45	10	30	5	-	-	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Sugarcane+	82.0±8.2	125	35	100	25	30	2.5	2	-
		Onion/	8.0±0.8	75	30	75	10	-	-	-	-
		Garlic	5.0±0.5	45	15	40	10	-	-	-	-
	Rabi	Sugarcane+	82.0±8.2	125	35	100	25	30	2.5	2	-
		Mungbean	0.7±0.07	7	7	5	-	-	-	-	-
Land Type: Medium Highland O.M.Low pH: 6.0-6.5 Texture: Loamy K-bearing minerals: Medium	**Rainfed**										
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-I	Jute(0)/	3.5±0.35	75	10	26	6	-	-	-	-
		Kaon	2.5±0.25	45	7	14	3	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	4	15	8	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	4	8	8	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Sesame	1.0±0.1	54	14	15	14	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	4	15	8	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	4	18	8	-	1.0	-	-
	Rabi	Wheat	2.5±0.25	45	10	18	3	2	-	1.5	-
	Kharif-I	Jute(0)	3.5±0.35	75	5	26	6	-	-	-	-
	Kharif-2	T.Aman(LIV)/	3.0±0.3	45	4	15	8	-	1.0	-	-
		T.Aman (MV)	4.0±0.	66	4	18	8	-	1.0	-	-
	Rabi	Potato	20±0.2	68	12	34	8	4	1.5	0.5	-
	Kharif-1	Jute(0)	3.5±0.35	75	5	20	5	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	3	10	8	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	4	12	8	-	1.0	-	-
	Rabi	Mustard	1.0±0.1	60	12	24	12	2	-	0.5	-
	Kharif-1	Lady's finger	12±1.2	63	8	21	5	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	18	8	-	1.0	-	-
	Rabi	Groundnut	2.0±0.2	33	20	27	18	4	-	0.5	-
	Kharif-1	T.Aus (MV)	2.8±0.28	36	3	10	5	-	1.0	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	18	8	-	1.0	-	-
	Irrigated										
	Rabi	Boro (MV)	6.0±0.6	120	14	46	10	-	1.5	-	-
	Kharif-I	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	18	8	-	1.0	-	-
	Rabi	Boro (MV)	4.8±0.5	96	10	27	8	-	1.0	-	-
	Kharif-I	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	45	4	8	8	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Wheat	3.5±0.35	90	16	38	5	4	-	1.0	-
	Kharif-1	Jute (0)	3.5±0.35	75	5	26	6	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	18	8	-	1.0	-	-
	Rabi	Maize	8.0±0.8	196	36	56	30	5	3.0	1.0	-
	Kharif-1	Fallow/	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	14	8	-	1.0	-	-
	Rabi	Potato	25.0±2.5	96	16	48	10	6	2.5	1.0	-
	Kharif-I	T.Aus (MV)	3.2±0.3	54	3	10	5	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	14	8	-	1.0	-	-
	Rabi	Potato	25±2.5	96	16	48	10	6	2.5	1.0	-
	Kharif-1	Jute (O)	3.5±0.35	75	5	20	6	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Mustard	1.6±0.16	84	18	33	18	2	-	1.0	-
	Kharif-1	Lady's finger/	12±1.2	63	8	21	5	-	-	-	-
		Brinjal	52±5.2	84	9	26	5	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	14	8	-	1.0	-	-
	Rabi	Mustard	1.2±0.10	54	12	24	10	4	-	1.0	-
		Boro (MV)	4.8±0.5	96	6	24	8	-	1.5	1.0	-
	Kharif-I	T.Aus (MV)	3.2±0.3	54	3	14	5	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	18	8	-	1.0	-	-

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AEZ 4 : KARATOYA-BANGALI FLOODPLAIN

LAND TYPES

Highland	- 23%
Medium Highland	- 44%
Medium Lowland	- 14%
Lowland	-1%
Homesteads + Water	-14%

LOCATION AND EXTENTS:

Eastern Half of Bogra district and most of Sirajgaonj district 2572 km² (257158 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Highland O.M. Low pH: 4.7-7.8 Texture: Silty loam & Silty Clay Loam K-bearing minerals: Low	**Rainfed**										
	Rabi	Wheat	25±0.25	45	10	30	3	-	0.5	1.0	-
	Kharif-1	Jute (O)	3.5±0.35	75	5	12	5	-	-	-	-
	Kharif-2	Mungbean	1.2±0.1	15	10	22	8	-	-	0.5	-
	Rabi	Wheat	25±0.25	45	10	30	3	-	0.5	1.0	-
	Kharif-1	Jute (O)/	3.5±0.35	75	5	42	5	-	-	-	-
		B.Aus (LIV)	2.5±0.25	30	3	18	2	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	25	6	-	1.0	-	-
	Rabi	Mustard	1.0±0.1	60	12	40	10	-	-	1.0	-
	Kharif-I	Jute(0)	3.5±0.35	75	5	42	5	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	25	6	-	1.0	-	-
	Rabi	Mustard	1.0±0.1	60	12	40	10	-	-	1.0	-
	Kharif-1	Kaon	2.5±0.25	45	6	22	2	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	25	6	-	1.0	-	-
	Rabi	Lentil	1.5±0.15	15	18	25	5	-	-	0.5	-
	Kharif-I	B.Aus (LIV)	2.5±0.25	30	3	18	2	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Chickpea	2±0.2	15	18	25	5	-	-	0.5	-
	Kharif-I	Jute(O)	35±0.35	75	5	42	5	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	25	6	-	1.0	-	-
	Rabi	Cabbage/	52±5.2	90	35	35	12	-	2.0	0.5	-
		Cauliflower	18.0±1.8	60	22	54	7	-	1.0	0.5	-
	Kharif-I	B.Aus (LIV)	2.5±0.25	30	3	12	2	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	16	6	-	1.0	-	-
	Rabi	Cabbage/	52.0±5.2	90	35	35	12	-	2.0	0.5	-
		Cauliflower	18.0±1.8	60	22	54	7	-	1.0	0.5	-
	Kharif-I	Jute (0)	3.5±0.35	75	5	27	5	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	16	6	-	1.0	0.5	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Cabbage/	52.0±5.2	90	35	35	12	-	2.0	0.5	-
		Cauliflower	18.0±1.8	60	22	54	7	-	1.0	0.5	-
	Kharif-1	Kaon	2.5±0.25	45	16	14	2	-	-	-	-
	Kharif-2	T.Aman(LIV)	3.0±0.3	45	3	16	6	-	1.0	-	-
	Irrigated										
	Rabi	Wheat	3.5±0.35	90	16	63	4	-	-	1.0	-
	Kharif-1	Jute (O)	3.5±0.35	75	5	42	5	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	28	7	-	1.0	-	-
	Rabi	Potato	25.0±2.5	96	16	80	8	-	1.5	1.0	-
	Kharif-1	T.Aus(MV)	3.2±0.3	54	4	16	5	-	-	-	-
	Kharif-2	T.Aman(MV)	4.0±0.4	66	5	18	7	-	1.0	-	-
	Rabi	Potato	25.0±2.5	96	16	80	8	-	1.5	1.0	-
	Kharif-1	Jute(0)	3.5±0.35	75	5	28	5	-	-	-	-
	Kharif-2	T.Aman(MV)	4.0±0.4	66	5	18	7	-	1.0	-	-
	Rabi	Mustard	1.6±0.16	84	18	55	14	-	1.0	1.0	-
	Kharif-1	Chilli	2.0±0.2	90	40	75	5	-	-	1.0	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Chilli	2.0±0.2	90	40	75	10	-	-	1.0	-
	Kharif-I	Fellow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman(LIV)/	3.0±0.3	45	3	16	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	5	16	7	-	1.0	-	-
Land type:	**Rainfed**										
Medium Highland	Rabi	Wheat	2.5±0.25	45	10	30	3	-	1.5	1.0	-
O.M: Low	Kharif-1	B.aus (LIV)/	2.5±0.25	30	3	18	2	-	-	-	-
pH: 5.4-5.7		Jute (C)/	2.8±0.3	42	5	30	3	-	-	-	-
Textrue:		Sesame	1.0±0.1	54	8	25	10	-	-	-	-
Clayey	Kharif-2	T.Aman(LIV)	3.0±0.3	45	3	25	6	-	1.0	-	-
K-bearing minerals: Low	Rabi	Mustard	1.0±0.1	60	12	40	10	-	-	1.0	-
	Kharif-1	Jute (C)	2.8±0.3	42	5	30	3	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	25	6	-	1.0	-	-
	Rabi	Grasspea/	1.2±0.12	12	6	10	2	-	-	0.5	-
		Blackgram	1.0±0.1	12	8	12	2	-	-	0.5	-
	Kharif-1	B.Aus (LIV)	2.5±0.25	30	3	18	2	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	3	25	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	5	28	7	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Grasspea	1.2±0.12	12	6	10	2	-	-	0.5	-
	Kharif-1	B.Aus(LIV)	2.5±0.25	30	3	10	2	-	-	-	-
	Kharif-2	B.Aman(LIV)	3.0±0.3	45	5	25	5	-	1.0	-	-
	Rabi	Cabbage/	52.±5.2	90	35	35	12	-	2.0	0.5	-
		Cauliflower	18.0±1.8	60	22	54	7	-	1.0	0.5	-
	Kharif-1	Jute (C)	2.8±0.3	42	5	20	3	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	3	16	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	5	20	7	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-I	Jute (C)	2.8±0.3	42	8	30	6	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	3	25	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	5	28	7	-	1.0	-	-
	Irrigated										
	Rabi	Boro (MV)	6.0±0.6	120	14	58	8	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	3	25	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	5	28	7	-	1.0	-	-
	Rabi	Wheat	3.5±0.35	90	16	63	4	-	-	1.0	-
	Kharif-1	T. Aus (MV)	3.2±0.3	54	4	25	5	-	-	-	
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	28	7	-	1.0	-	-
	Rabi	Wheat	3.5±0.35	90	16	63	4	-	-	1.0	-
	Kharif-1	Jute (C)	2.8±0.3	42	5	30	3	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	3	25	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	5	28	7	-	1.0	-	-
	Rabi	Potato	25.0±2.5	96	16	80	8	-	1.5	1.0	-
	Kharif-1	Jute (C)	2.8±0.3	42	5	18	3	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	20	7	-	1.0	-	-
	Rabi	Potato	25.0±2.5	96	16	80	8	-	1.5	1.0	-
		Boro (MV)	4.8±0.5	96	5	26	8	-	1.0	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	20	7	-	1.0	-	-
	Rabi	Mustard	1.6±0.16	84	18	55	14	-	1.0	1.0	-
		Boro (MV)	4.8±0.5	96	5	40	8	-	1.0	-	-
	Kharif-1		-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	3	25	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	5	28	7	-	1.0	-	-
	Rabi	Mustard	1.6±0.16	84	18	55	14	-	1.0	1.0	-
	Kharif-1	Chilli	2.0±0.2	90	40	75	5	5	-	-	-
	Kharif-2	Fallow/	-	-	-	-	-	-	-	-	-
		T.Aman (LIV)	3.0±0.3	45	3	16	6	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Coriander	2.0±0.2	90	24	50	5	-	-	-	-
	Kharif-1	T. Aus (MV)	3.2±0.3	54	4	16	5	-	-	-	
	Kharif-2	T.Aman (MV)	4.0±0.4	66	8	18	7	-	1.0	-	-
	Rabi	Cabbage/	80±8	126	50	35	16	-	1.0	1.0	-
		Cauliflower	28±2.8	84	30	75	10	-	1.0	1.0	-
	Kharif-1	Jute (O)	3.5±0.4	75	5	27	5	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	20	7	-	1.0	-	-
Land type: Medium lowland O.M: Low pH: 6.2-7.7	**Rainfed**										
	Rabi	Grasspea	1.2±0.12	12	6	10	2	-	-	0.5	-
	Kharif	B.Aman (LIV)	2.5+0.3	30	3	10	4	-	1.0	-	-
	Rabi	Mustard	1.0±0.1	63	12	27	8	-	-	1.0	-
	Kharif	B.Aman (LIV)	2.5±0.3	30	3	10	4	-	1.0	-	-
	Irrigated										
	Rabi	Boro (MV)	4.8±0.5	96	10	45	6	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	3	25	6	-	1.0	-	-
	Rabi	Maize	8.0±0.8	196	36	93	25	-	2.0		
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	16	6	-	1.0	-	-

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AEZ 5 : LOWER ATRAI BASIN

LAND TYPES

Highland	- 2%
Medium Highland	- 8%
Medium Lowland	- 21%
Lowland	- 65%
Homestead + Water	- 4%

LOCATION AND EXTENTS:

Most of this region lies in Naogaon and Natore districts Small areas extend into Rajshahi, Bogra and Sirajgoanj district 851 km^2 (85105 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Medium Lowland O.M. Medium pH: 4.8-6.0 Texture: Clayey K-bearing minerals: High	**Rainfed**										
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif	B.Aman(LIV)	2.5±0.3	25	8	10	4	-	1.0	-	-
	Rabi	Grasspea	1.2±0.1	10	8	6	5	-	-	-	-
	Kharif	B.Aman(LIV)	2.5±0.3	25	8	10	4	-	1.0	-	-
	Rabi	Grasspea	1.2±0.1	10	8	6	5	-	-	-	-
	Kharif	B.Aus+B.Aman	2.5±0.3	30	8	10	4	-	1.0	-	-
Land Type: Lowland O.M. Medium pH: 4.8-6.0 Texture: Clayey K-bearing minerals: High	**Irrigated**										
	Rabi	Boro(MV)/	4.8±0.5	80	12	27	6	-	1.0	-	-
		Boro (LIV)	4.0±0.4	40	10	20	5	-	1.0	-	-
	Kharif-I	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif	B.Aman(LIV)	2.5+0.2	25	8	10	4	-	1.0	-	-

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AEZ 6 : LOWER PURNABHABA FLOODPLAIN

LAND TYPES

Medium Lowland	- 10%
Lowland	- 60%
Homestead + Water	- 30%

LOCATION AND EXTENTS:

Extreme western part of Noagaon districts and the estreme northern part of Nawabganj district
129 km^2 (12900 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Lowland O.M. Medium pH: 4..5 Texture: Clayey K-bearing minerals: High	**Irrigated**										
	Rabi	Boro (MV)	4.8±0.5	80	10	27	5	-	1.0	-	-
	Kharif-I	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Watermelon	35±3.5	45	12	32	8	-	-	-	-
		Boro (MV)	4.8±0.5	80	7	20	5	-	1.0	-	-
	Kharif	Fallow	-	-	-	-	-	-	-	-	-

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AEZ 7 : ACTIVE BRAHMAPUTRA AND JAMUNA FLOODPLAIN

LAND TYPES

Highland	- 5%
Medium Highland	- 37%
Medium Lowland	- 20%
Lowland	- 8%
Homestead + Water	- 30%

LOCATION AND EXTENTS:

Eastern parts of Kurigram, Gaibandha, Bogra, Sirajaganj and Pabna districts and Manikganj districts. Minor areas also occur in Dhaka, Munshiganj, Narayanganj and Chandpur districts

3190 km^2 (319001 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Medium Highland O.M. Very Low pH: 7.5-7.9 Texture: Sandy Loan K-bearing minerals: Low	**Rainfed**										
	Rabi	Wheat	2.5±0.25	38	10	24	3	-	-	1.0	-
	Kharif-I	B.Aus (LIV)/	2.5±0.2	25	3	14	2	-	-	-	-
		Jute (C)	2.8±0.3	35	4	23	3	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Sweet Potato	30.0±3.0	60	24	50	8	3.0	1.0	0.5	-
	Kharif-I	B.Aus(LIV)/	2.5±0.2	25	3	10	2	-	-	-	-
		Jute (C)	2.8±0.3	35	4	16	3	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Mustard	1.0±0.1	50	12	32	10	-	1.0	0.5	-
	Kharif-I	B.Aus (LIV)	2.5±0.2	25	3	14	2	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Mustard	1.0±0.1	50	12	32	10	-	1.0	0.5	-
	Kharif-I	Jute (C)	2.8±0.3	35	4	23	3	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	38	3	19	6	-	1.0	-	-
	Rabi	Groundnut	1.6±0.2	20	14	25	40	-	1.0	0.5	0.5
	Kharif-I	B.Aus(LIV)	2.5±0.2	25	3	14	2	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-I	B.Aus(LIV)/	2.5±0.3	25	6	14	4	-	-	-	-
		Jute(C)	2.8±0.3	35	8	26	6	-	-	-	-
	Kharif-2	T.Aman(LIV)	3.0±0.3	38	2	19	6	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-I	Kaon	2.0±0.2	38	12	20	4	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	38	3	19	6	-	1.0	-	-
	Rabi	Cheena/	1.3±0.1	38	10	22	2	-	1.0	-	-
		Chickpea	2.0±0.2	12	18	20	5	-	1.0	0.5	0.5
	Kharif	B.Aus +B.Aman	2.5±0.3	15	4	15	4	-	-	0.5	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Sucarcane	60.0±6	75	25	55	12	5	2	-	-
	Irrigated										
	Rabi	Boro (MV)	6.0±0.6	100	14	46	8	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	56	4	23	7	-	1.0	-	-
	Rabi	Wheat	3.5±0.35	75	16	50	4	-	-	1.0	-
	Kharif-I	Jute(0)	3.5±0.35	63	5	33	5	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	56	4	23	7	-	1.0	-	-
	Rabi	Mustard (LIV)	1.2±0.1	45	12	30	8	-	-	1	-
		Boro (MV)	4.8±0.5	80	6	32	6	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	56	4	23	7	-	1.0	-	-
Land Type: Medium lowland O.M: Low pH: 7.5-7.9 Texture: Silty K-bearing minerals: Medium	**Rainfed**										
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif	B.Aman(L)	2.5±0.2	25	4	15	4	-	-	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif	B.Aus+B.Aman	2.5±0.3	30	4	15	4	-	-	-	-
	Rabi	Mustard	1.0±0.1	50	12	32	10	-	-	1.0	-
	Kharif	B.Aus+B.Aman	2.5±0.3	30	4	15	4	-	1.0	-	-
	Rabi	Grasspea	1.2+0.1	10	6	8	3	-	1.0	0.5	-
	Kharif	B.Aus+B.Aman	2.5+0.3	30	4	15	4	-	-		-
	Irrigated										
	Rabi	Boro (LIV)	2.8+0.3	50	12	20	5	-	1.0	-	-
	Kharif	B.Aman	2.5+0.3	25	4	15	4	-	-	-	-
	Rabi	Boro (MV)	4.8±0.5	80	10	36	6	-	-	-	-
	Kharif	B.Aman	2.5+0.3	25	4	15	4	-	-	-	-
	Rabi	Wheat	3.5±0.35	75	16	50	4	-	-	1.0	-
	Kharif-I	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman(LIV)	3.0+0.3	38	3	19	6	-	1.0	-	-
	Rabi	Potato	25.0±2.5	100	16	64	8	5	1.5	-	-
	Kharif-I	Jute(C)	2.8+0.3	35	4	16	3	-	-	-	-
	Fallow	-	-	-	-	-	-	-	-	-	-

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AEZ 8 : YOUNG BRAHMAPUTRA AND JAMUNA FLOODPLAIN

LAND TYPES

Highland	- 18%
Medium Highland	- 42%
Medium Lowland	- 19%
Lowland	- 9%
Homestead + Water	- 12%

LOCATION AND EXTENTS:

Western parts of Shepur, Jamalpur and Tangail Districts, parts of Manikganj, Dhaka, Munshiganj Narayanganj and Gazipur districts and a belt adjoing the old Brahmaputra channel through Mymensingh, Kishoreganj and Narshingdi districts
5924 km^2 (592394 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type:	**Rainfed**										
Highland	Rabi	Wheat	2.5±0.5	45	14	18	3	-	-	0.5	-
O.M. : very	Kharif-1	B.Aus (L)/	2.5±0.2	30	4	10	3	-	-	-	-
Low		Jute (0)	3.5±0.35	75	7	26	6	-	-	-	-
pH: 5.6 7.5	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	16	8	-	1.0	-	-
Texture: Sandy/Silty	Rabi	Potato/	20±0.2	68	14	34	7	1.5	1.0	0.5	-
K-bearing		Sweet Potato	24.0+2.4	54	22	26	4	1.0	1.0	0.5	-
minerals	Kharif-1	Jute (0)	3.0±0.3	75	7	20	6	-	-	-	-
Medium	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Mustard	1.0±0.1	60	16	24	13	-	-	0.5	
	Kharif-1	B. Aus (L)/	2.5±0.25	30	4	10	3	-	-	-	-
		Jute (0)	3.5±0.35	75	7	26	6	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0+0.3	45	5	16	8	-	1.0	-	-
	Rabi	Cabbage	52±5.2	90	45	15	14	-	1.5	0.5	-
	Kharif-1	B.Aus (LIV)/	2.5±0.3	30	4	10	3	-	-	-	-
		Jute (0)	3.0±0.3	75	7	20	5	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Mouri	2.0±0.2	90	36	40	15	-	-	-	-
	Kharif-1	Jute (O)	3.0±0.3	75	7	26	6	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	16	8	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-I	B.Aus (LIV)/	2.5±0.3	30	8	10	3	-	1.0	-	-
		Jute (O)	3.0±0.3	75	13	29	7	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	16	8	-	1.0	-	-
	Rabi	Sugarcane	8.0±8.0	120	32	80	24	-	2.5	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Irrigated										
	Rabi	Boro (MV)	6.0±0.6	120	18	36	10	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	18	8	-	0.5	-	-
	Rabi	Boro (MV)	4.8±0.5	96	13	27	8	-	1.0	-	-
	Kharif-1	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	45	5	18	8	-	0.5	-	-
		T.Aman (LIV)/	3.0±0.3	35	5	16	6	-	0.5	-	-
	Rabi	Wheat	3.5±0.35	90	20	38	5	1.2	-	1.0	-
	Kharif-1	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	35	5	16	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	45	5	18	8	-	1.0	-	-
	Rabi	Wheat	3.5±0.35	90	20	38	5	1.2	-	1.0	-
	Kharif-I	Jute (C)	2.8±0.3	42	6	18	4	-	-	-	-
	Kharif=2	T.Aman (MV)	4.0+0.4	66	5	18	8	-	0.5	-	-
	Rabi	Mustard (LIV)/	1.2 ±0.1	54	15	24	10	-	-	1.0	-
		Boro (MV)	4.8±0.5	96	7	27	8	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	18	8	-	1.0	-	-
	Rabi	Sugarcane	100.0±10.0	150	40	100	30	-	2.5	-	-
	Rabi	Sugarcane+	100.0±10.0	150	40	100	30	-	2.5	-	-
		Potato	10.0±1.0	70	15	60	-	-	-	-	-
	Rabi	Sugarcane+	100.0±10.0	150	40	100	30	-	2.5	-	-
		Onion/	8.0±0.8	75	30	75	30	-	-	-	-
		Garlic	-	-	-	-	-	-	-	-	-
	Rabi	Sugarcane+	100.0±10.0	150	40	100	30	-	2.5		-
		Mungbean/Lentil	0.5±0.1	10	12	7.5	-	-	-	-	-
Land Type: Medium Highland O.M: Low pH: 5.4-7.5 Texture Loamy K-bearing minerals: Medium	**Rainfed**										
	Rabi	Wheat	2.5±0.25	45	14	18	3	-	-	0.5	-
	Kharif-1	Jute (0)/	3.5±0.35	75	7	26	6	-	-	-	-
		Sesame	1.0±0.1	55	10	14	7	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	16	8	-	1.0	-	-
	Rabi	Potato	20±2.0	68	14	34	7	1.5	1.0	0.5	-
	Kharif-1	Jute (0)/	3.0±0.3	75	7	20	6	-		-	-
		B.Aus (LIV)	2.5±0.3	30	4	8	3	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	5	12	8	-	1.0	-	-
		T.Aman (MV)	3.2±0.3	42	4	9	7	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Mustard/	1.0±0.1	60	16	24	13	-	-	0.5	-
		Lentil	1.2±0.1	11	16	12	5	-	-	0.5	-
	Kharif-1	B.Aus(LIV)	2.5±0.3	30	4	10	3	-	-	-	-
	Kharif-2	T.Aman(LIV)	3.0±0.3	45	5	16	8	-	1.0	-	-
	Rabi	Mustard	1.0±0.1	60	16	24	13	-	-	0.5	-
	Kharif-1	T.Aus (MV)	3.2±0.3	54	4	15	3	-	-	-	-
		Jute(O)	3.5±0.35	75	7	26	6	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	16	8	-	1.0	-	-
	Rabi	Mustard	1.0±0.1	60	16	24	13	-	-	0.5	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	16	8	-	1.0	-	-
	Rabi	Lentil/	1.2±0.1	11	16	12	5	-	-	0.5	-
		Mustard	1.0±0.1	60	16	24	13	-	-	0.5	-
	Kharif-1	Jute (0)	3.0±0.3	75	7	26	6	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	16	8	-	1.0	-	-
	Rabi	Lentil/	1.2±0.1	11	16	12	5	-	-	0.5	-
		Mustard	1.0±0.1	60	16	24	13	-	-	0.5	-
	Kharif-1	Kaon	2.0±0.2	38	12	13	3	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	16	8	-	1.0	-	-
	Rabi	Lentil/	1.2±0.1	11	16	12	5	-	-	0.5	-
		Mustard	1.0±0.1	60	16	24	13	-	-	0.5	-
	Kharif	B.Aus (LIV)	2.5±0.3	30	4	10	3	-	-	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	T.Aus (LIV)	2.5±0.3	30	8	12	5	-	-	-	-
	Kharif-2	T.Aman (LIV)	2.8±0.3	45	5	16	8	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Jute (C)/	2.8±0.3	42	10	20	8	-	-	-	-
		B.Aus (LIV)	2.5±0.3	30	8	10	3	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	16	8	-	1.0	-	-
	Irrigated										
	Rabi	Boro (MV)	6.0±0.6	120	18	36	10	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)/	4.0±0.4	66	5	18	8	-	1.0	-	-
		T.Aman (LIV)	3.0±0.3	45	5	16	8	-	1.0	-	-
	Rabi	Wheat	3.5±0.35	90	20	38	5	1.2	-	1.0	-
	Kharif-1	Jute (O)	3.5±0.35	75	7	20	6	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	18	8	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Potato	25.0±2.5	96	20	48	10	2	1.5	1.0	-
	Kharif-1	Jute (0)/	3.5±0.35	75	7	20	6	-	-	-	-
		T.Aus (MV)	3.2±0.3	54	4	12	5	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	5	13	8	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	5	15	8	-	1.0	-	-
	Rabi	Mustard	1.2±0.1	54	15	24	10	-	-	1.0	-
		Boro (MV)	4.8±0.5	96	7	27	8	-	1.0	-	-
	Khaif-2	T.Aman (LIV)	3.0±0.3	45	5	16	8	-	1.0	-	-
		T.Aman(HYV)	4.0±0.4	66	5	18	8	-	1.0	-	-
Land type:	**Rainfed**										
Medium lowland	Rabi	Boro (MV)	4.1±0.4	58	10	20	6	-	1.0	-	-
	Kharif	DWT.Aman	2.5±0.3	3.0	6	10	5	-	-	-	-
O.M.: Low	Rabi	Boro (MV)	4.1±0.4	58	10	20	6	-	1.0	-	-
pH: 5.4-7.5	Kharif-I	Fallow	-	-	-	-	-	-	-	-	-
Texture:	Kharif-2	T.Aman (LIV)/	3.0±0.3	38	5	16	8	-	1.0	-	-
K-bearing minerals:		T.Aman (MV)	3.2±0.4	42	4	11	6	-	1.0	-	-
	Rabi	Wheat	2.5±0.25	38	13	18	3	-	-	0.5	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	38	5	16	8	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	56	6	18	8	-	1.0	-	-
	Rabi	Wheat	2.5±0.25	38	13	18	3	-	-	0.5	-
	Kharif-1	Jute (C)/	2.8±0.3	35	5	18	4	-	-	-	-
		B.Aus (LIV)	2.5±0.25	26	4	10	3	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Wheat	2.5±0.25	38	13	18	3	-	-	0.5	-
	Kharif	B.Aman (LIV)	2.3±0.3	3.0	6	10	5	-	-	-	-
	Rabi	Potato	20.0±2.0	58	14	34	7	1.5	1.0	0.5	-
	Kharif	B.Aman (LIV)	2.3±0.3	3.0	6	10	5	-	-	-	-
	Rabi	Sweet Potato	24±2.4	44	22	28	10	3	1.0	0.5	-
	Kharif-1	Jute (C)	2.8±0.3	35	5	16	4	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	38	5	13	8	-	-	-	-
	Rabi	Mustard	1.0±0.1	54	17	23	12	-	1.0	0.5	-
	Kharif-1	Jute (C)	2.8±0.3	35	6	18	4	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Mustard	1.0±0.1	54	17	23	12	-	1.0	0.5	-
		Boro (MV)	4.1±0.4	58	6	20	6	-	1.0	-	-
	Kharif	Fallow	-	-	-	-	-	-	-	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Grasspea	1.2±0.1	16	12	10	4	-	-	0.5	-
	Kharif	Jute (C) /	2.8±0.3	35	6	18	4	-	1.0	-	-
		B.Aman (LIV)	2.5±0.3	30	6	10	5	-	-	-	-
	Rabi	Grasspea + Mustard	2.0±0.2	50	15	30	15	-	-	0.5	-
	Kharif	B.Aman	2.5±0.3	30	6	10	5	-	1.0	-	-
	Rabi	Onion	10.0±1.0	54	27	43	18	-	-	-	-
	Kharif	B.Aman (LIV)	2.5±0.3	30	6	10	5	-	-	-	-
	Irrigated										
	Rabi	Boro (MV)	4.8±0.5	80	14	27	8	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman(MV)	4.0±0.4	56	6	18	8	-	1.0	-	-
	Rabi	Boro (MV)	4.8±0.5	80	14	27	8	-	1.0	-	-
	Kharif	B.Aman (LIV)	2.5±0.3	30	6	10	5	-	-	-	-
	Rabi	Potato	25±2.5	80	20	48	10	2	1.5	1.0	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	38	5	13	8	-	1.0	-	-
	Rabi	Potato	25±2.5	80	20	48	10	2	1.5	1.0	-
	Kharif-1	Jute (C)	2.8±0.3	35	5	16	4	-	1.0	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-

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AEZ 9 : OLD BRAHMAPUTRA FLOODPLAIN

LAND TYPES

Highland	- 28%
Medium Highland	- 35%
Medium Lowland	- 20%
Lowland	- 7%
Homestead + Water	- 10%

LOCATION AND EXTENTS:

Large areas in Sherpur, Jamalpur, Tangail, Mymensingh, Netrokona, Kshoreganj, Narsingdi and and Narayanganj districts. Small areas in the east of Dhaka and Gazipur districts.

7230 km^2 (723037 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Highland O.M. Low pH: 5.1-5.6 Texture: Silt Loam K-bearing minerals: Low	**Rainfed**										
	Rabi	Wheat	2.5±0.25	45	10	30	3	-	-	0.5	-
	Kharif-I	B.Aus (L)/	2.5±0.3	30	4	18	2	-	-	-	-
		Jute(0)	3.5±0.35	75	6	42	5	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	25	6	-	1.0	-	-
	Rabi	Wheat	2.5±0.25	45	10	30	3	-	-	0.5	-
	Kharif-1	Jute (C)	2.8±0.3	42	4	29	3	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	29	7	-	1.0	-	-
	Rabi	Potato	20±2.0	68	12	56	6	-	1.0	0.5	-
	Kharif-1	Jute (C)	2.8±0.3	42	4	22	3	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	22	7	-	1.0	-	-
	Rabi	Mustard	1.0±0.1	60	12	40	10	-	-	0.5	-
	Kharif-1	Jute(C)	2.8±0.3	42	4	29	3	-	-	-	-
	Kharif-2	T.Aman(LIV)/	3.0±0.3	45	3	25	6	-	1.0	-	-
		T.Aman(MV)	4.0±0.4	66	4	29	7	-	1.0	-	-
	Rabi	Lentil	1.5±0.15	15	18	25	10	-	-	0.5	-
	Kharif-1	B.Aus (L)/	2.5±0.2	30	4	18	2	-	-	-	-
		Jute (0)	3.0±0.3	75	6	42	5	-	1.5	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Chickpea	2.0±0.2	15	18	25	10	-	0.8	0.5	0.5
	Kharif-I	Jute(C)	2.8±0.3	42	4	29	3	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Onion/	10.0±1.0	65	22	72	14	-	1.5	0.5	-
		Garlic	7.0±0.7	65	22	72	14	-	1.5	0.5	-
	Kharif-1	B.Aus (LIV)/	2.5±0.3	30	4	14	2	-	-	-	-
		Jute (0)	3.5±0.35	75	6	31	5	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Jute (C)	2.8±0.3	42	8	29	3	-	-	--	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	29	7	-	1.0	-	-
	Rabi	Sugarcane	60.0±6	100	25	55	15	-	2	-	-
	Irrigated										
	Rabi	Boro (MV)	6.0±0.6	120	14	58	8	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	29	6	-	1.0	-	-
	Rabi	Boro (MV)	4.8±0.5	96	10	45	6	-	1.0	-	-
	Kharif-1	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	34	3	25	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	55	4	29	6	-	1.0	-	-
	Rabi	Boro (MV)	4.8±0.5	96	10	45	6	-	1.0	-	-
	Kharif-1	T.Aus (MV)	3.2±0.3	54	3	25	4	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	29	6	-	1.0	-	-
	Rabi	Mustard (LIV)/	1.2±0.1	54	12	38	8	-	-	1.0	-
		Boro (MV)	4.8±0.5	96	6	40	6	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)/	4.0±0.4	66	4	29	6	-	1.0	-	-
		T.Aman (LIV)	3.0±0.3	45	3	25	6	-	1.0	-	-
	Rabi	Wheat	3.5±0.35	90	16	63	4	-	-	1.0	-
	Kharif-1	Jute (C)	2.8±0.3	42	4	29	3	-	-	-	-
		T.Aus (MV)	3.2±0.3	54	3	25	4	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	29	6	-	1.0	-	-
	Rabi	Potato	25±2.5	96	16	80	8	-	1.5	1.0	-
	Kharif-1	Jute (C)	2.8±0.3	42	4	22	3	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	22	6	-	1.0	-	-
	Rabi	Cabbage/	80±8.0	126	50	35	16	-	2.0	0.5	-
		Cauliflower	28±2.8	84	30	75	10	-	1.0	1.0	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	22	6	-	1.0	-	-
Land Type:	**Rainfed**										
Medium Highland	Rabi	Wheat	2.5±0.25	45	10	30	3	-	-	0.5	-
O.M:Medium	Kharif-1	Jute (C)	2.8±0.3	42	4	29	3	-	-	-	-
pH: 5.1-5.6	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	25	5	-	1.0	-	-
Texture Loam	Rabi	Potato	20±2.0	68	12	56	6	-	1.0	0.5	-
K-bearing minerals: Low	Kharif-1	Jute (C)	2.8±0.3	42	4	22	3	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	22	7	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Mustard	1.0±0.1	60	12	40	10	-	-	0.5	-
	Kharif-1	T.Aus (MV)	2.8±0.3	36	3	18	4	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.5	45	3	25	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	4	29	7	-	1.0	-	-
	Rabi	Mustard	1.0±0.1	60	12	40	10	-	-	0.5	-
	Kharif-1	Ladies finger/	8.0±0.8	46	6	38	8	-	-	-	
		Jute (C)	2.8±0.3	42	4	22	3	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	29	7	-	1.0	-	-
	Rabi	Lentil	1.5±0.5	15	18	25	10	-	-	0.5	-
	Kharif-1	T.Aus (MV)	3.2±0.3	54	3	25	4	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	3	25	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	4	29	7	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	B.Aus (L)/	2.5±0.3	30	6	18	2	-	-	-	-
		Jute (C)	2.8±0.3	42	8	29	3	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	29	7	-	1.0	-	-
	Irrigated										
	Rabi	Boro (MV)	6.0±0.6	120	14	58	8	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	29	6	-	1.0	-	-
	Rabi	Boro (MV)	4.8±0.5	96	10	45	6	-	1.0	-	-
	Kharif-1	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)/	4.0±0.4	55	4	29	6	-	1.0	-	-
		T.Aman (LIV)	3.0±0.3	34	3	25	6	-	1.0	-	-
	Rabi	Wheat	3.5±0.35	90	16	63	4	-	-	1.0	-
	Kharif-1	Jute (C)/	2.8±0.3	42	4	29	3	-	-	-	-
		T.Aus (MV)	3.2±0.3	54	3	25	4	-	1.0	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	29	6	-	1.0	-	-
	Rabi	Potato	25±2.5	96	16	80	8	-	1.5	1.0	-
		Boro (MV)/	4.8±0.5	96	6	29	6	-	1.0	-	-
	Kharif-1	Jute(C)	2.8±0.3	42	4	22	3	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	22	6	-	1.0	-	-
	Rabi	Mustard	1.2±0.1	54	12	38	8	-	-	1.0	-
		Boro (MV)/	4.8±0.5	96	6	40	6	-	1.0	-	-
	Kharif-1	T.Aus (MV)	3.2±0.3	54	3	25	4	-	1.0	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	29	7	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Medium Lowland O.M:Medium pH: 5.1-5.6 Texture Loam K-bearing minerals: Low	**Rainfed**										
	Rabi	Boro (LIV)	2.8±0.3	48	6	26	4	-	1.0	-	-
	Kharif	B.Aman (LIV)	2.5±0.3	25	4	20	4	-	-	-	-
	Rabi	Boro (LIV)	2.8±0.3	48	6	26	4	-	0.5	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	25	6	-	0.5	-	-
	Rabi	Wheat	2.5±0.25	45	10	30	3	-	-	1.0	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	3.2±0.3	42	3	18	4	-	1.0	-	-
	Rabi	Potato	20.0±2.0	68	12	56	6	-	1.0	0.5	-
	Kharif	B.Aman (LIV)	2.5±0.3	25	4	20	4	-	-	-	-
	Rabi	Mustard	1.0±0.1	60	12	40	10	-	-	0.5	-
	Kharif-1	Jute (C)	2.8±0.3	42	4	29	3	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Grasspea	1.2±0.1	12	6	10	4	-	-	0.5	-
	Kharif	B.Aus+B.Aman(L)	2.5±0.3	25	5	20	4	-	-	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Jute(C)	2.8±0.3	42	8	29	3	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	29	7	-	1.0	-	-
	Irrigated										
	Rabi	Mustard	1.2±0.1	54	12	38	8	-	-	1.0	-
		Boro (MV)	4.8±0.5	96	6	40	6	-	1.0	-	-
	Kharif	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Boro (MV)	4.8±0.5	96	10	45	6	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	4	29	7	-	1.0	-	-

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AEZ 10 : ACTIVE GANGES FLOODPLAIN

LAND TYPES

Highland	- 12%
Medium Highland	- 33%
Medium Lowland	- 18%
Lowland	- 4%
Homestead + Water	- 33%

LOCATION AND EXTENTS:

The region extends along the Ganges and lower Meghna river Channels from the Indian border Nowabganj and Rajshahi District to the mouth of Meghna Estuary in Lakshmipur and Barisal districts 3334 km^2 (333447 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Highland O.M:Low pH: 6.5-7.5 Texture: Loamy K-bearing minerals: Medium	**Rainfed**										
	Rabi	Wheat	2.5±0.25	38	10	18	5	-	1.0	-	-
	Kharif-1	B.Aus (LIV)/	2.5±0.25	25	4	9	3	-	-	-	-
		Jute (0)	3.5±0.35	63	7	26	5	-	1.0	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Lentil /	1.5±0.15	13	18	16	10	-	1.0	0.5	-
		Chickpea	2.0±0.2	13	18	16	10	-	1.0	0.5	0.5
	Kharif-I	B.Aus (LIV)/	2.5±0.25	25	4	9	4	-	-	-	-
		Jute(0)	3.0±0.3	63	7	26	5	-	1.0	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Onion/	10.0±0.10	54	22	43	14	-	1.5	0.5	-
		Garlic	7.0±0.7	54	30	43	14	-	1.5	0.5	-
	Kharif-1	B.Aus (LIV)	2.5±0.25	25	4	8	3	-	-	-	-
		Jute (0)	3.5±0.35	63	7	20	5	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
Land Type: Medium Highland O.M: Low pH:6.9-7.9 Texture: Loamy K-bearing minerals: Medium	**Rainfed**										
	Rabi	Blackgram/	1.0±0.1	10	9	8	2	-	1.0	-	-
		Wheat	2.5±0.25	38	10	18	5	-	1.0	0.5	-
	Kharif-1	B.Aus (LIV)	2.5±0.3	25	4	9	3	-	-	-	-
		Jute (0)	3.5±0.35	63	7	26	5	-	1.0	-	-
	Kharif-2	Fallow/	-	-	-	-	-	-	-	-	-
		T.Aman(LIV)	3.0±0.3	37	4	15	6	-	1.0	-	-
	Rabi	Mustard/	1.0±0.1	50	12	24	14	-	1.0	1.5	-
		Onion	10.0±1.0	54	22	34	14	-	1.5	-	-
	Kharif-1	B.Aus	2.5±0.25	25	4	9	3	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Lentil	1.5±0.15	13	18	16	10	-	-	0.5	-
	Kharif-1	B.Aus (L)	2.5±0.25	25	4	9	3	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	B.Aus(LIV)	2.5±0.25	25	6	12	5	-	-	-	-
	Kharif-2	Blackgram	1.0±0.1	10	9	8	-	-	1.0	-	-
	Rabi	Onion/	10.0±1.0	54	22	43	14	-	1.0	0.5	-
		Garlic	7.0±0.7	54	22	43	14	-	1.0	0.5	-
	Kharif-1	B.Aus (LIV)	2.5±0.25	25	4	8	3	-	-	-	-
		Jute(0)	3.5±0.35	63	7	20	5	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	38	4	12	6	-	1.0	-	-
	Irrigated										
	Rabi	Wheat	3.5±0.35	75	16	38	4	-	-	0.5	-
	Kharif-1	Jute (C)	2.8±0.3	35	45	18	3	-	-	-	-
	Kharif-2	T.aman (MV)	4.0±0.4	55	5	18	6	-	1.0	-	-
	Rabi	Mustard	1.2±0.12	45	12	23	8	-	-	0.5	-
		Boro (MV)/	4.8±0.5	80	7	24	6	-	1.0	-	-
	Kharif-1	T.Aus (MV)	3.2±0.3	45	4	15	4	-	0.5	-	-
	Kharif-2	Fallow/									
		T.Aman (MV)	4.0±0.4	55	5	18	6	-	1.0	-	-
Land Type: Medium Lowland O.M: Medium pH 6.9-7.9 Texture: Clayey K-bearing minerals: High	**Rainfed**										
	Rabi	Wheat	2.5±0.25	38	10	18	5	-	1.0	-	-
	Kharif-1	B.Aus (L)/	2.5±0.25	25	4	9	3	-	-	-	-
		Jute (C)	2.8±0.3	35	5	18	3	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Potato	20.0±2.0	68	12	56	6	-	1.5	-	
	Kharif	Jute (C)/	2.8±0.3	35	35	13	3	-	-	-	-
		B.Aman (LIV)	2.5±0.3	30	5	12	4	-	-	-	-
	Rabi	Groundnut	2.0±0.2	28	20	27	14	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	Blackgram	1.0±0.1	10	5	7	4	-	-	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif	B.Aman (LIV)	2.5±0.3	30	5	12	4	-	-	-	-
	Irrigated										
	Rabi	Boro (MV)	4.8±0.5	80	10	27	6	-	1.0	-	-
	Kharif	B.Aman (LIV)	2.5±0.3	30	5	12	4	-	-	-	-

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AEZ 11 : HIGH GANGES RIVER FLOODPLAIN

LAND TYPES

Highland	- 43%
Medium Highland	- 32%
Medium Lowland	- 12%
Lowland	- 2%
Homestead + Water	- 11%

LOCATION AND EXTENTS:

Nawabganj, Rajshahi, southern Pabna, Kushtia, Meherpur, Chuadanga, Jhenaida, Magura, Jessore, Satkhira and Khulna district together with minor areas in Noagaon and Narail district

13205 km^2 (1320549 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Highland O.M. Low pH: 6.1-7.5 Texture: Sandy Loam K-bearing minerals: Medium	**Rainfed**										
	Rabi	Sugarcane	80.0±8.0	120	40	72	27	-	3.0	-	-
	Rabi	Wheat	2.5±0.25	45	10	18	3	-	0.5	0.5	-
	Kharif-I	B.Aus (LIV)/	2.5±0.25	30	4	10	2	-	-	-	-
		Jute(0)	3.5±0.35	75	7	26	7	-	1.0	-	-
	Kharif-2	Fallow/	-	-	-	-	-	-	-	-	-
		T.aman (LIV)	3.0±0.3	45	5	15	6	-	1.0	-	-
	Rabi	Wheat	2.5±0.25	45	10	18	3	-	0.5	0.5	-
	Kharif-I	Mungbean	1.2±0.1	15	18	14	5	-	-	1.0	0.5
	Kharif-2	T.Aman (MV)	4.0±0.4	66	6	18	7	-	1.0	-	-
	Rabi	Wheat	2.5±0.2	45	10	18	3	-	0.5	0.5	-
	Kharif-1	Lady's finger	8.0±0.8	45	12	15	3	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	15	6	-	1.0	-	-
	Rabi	Wheat	2.5±0.25	45	10	18	3	-	0.5	0.5	-
	Kharif-1	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	40	6	18	7	-	1.0	-	-
	Rabi	Wheat	2.5±0.25	45	10	18	3	-	0.5	0.5	-
	Kharif-1	T.Aus (MV)	3.5±0.4	54	4	16	4	-	1.0	-	-
	Kharif-2	Blackgram	1.0±0.15	12	8	7	3	-	-	-	-
	Rabi	Wheat	2.5±0.25	45	10	18	3	-	0.5	0.5	-
	Kharif-1	Jute(O)	3.5±0.35	75	7	26	7	-	1.0	-	-
	Kharif-2	Blackgram	1.0±0.15	12	8	7	3	-	-	-	-
	Rabi	Potato	20±0.2	68	12	34	8	-	1.5	0.5	-
	Kharif-1	T.Aus (MV)	3.2±0.3	54	4	10	4	-	1.0	-	-
	Kharif-2	Blackgram	1.0±0.1	12	8	4	3	-	-	-	
	Rabi	Mustard/	1.0±0.1	60	12	24	10	-	1.0	0.5	-
		Groundnut	2.0±0.2	33	20	27	14	-	1.0	-	-
	Kharif-1	Jute (0)/	3.5±0.35	75	7	26	7	-	1.0	-	-
		B.Aus (LIV)	2.5±0.25	30	4	10	2	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Mustard	1.0±0.1	60	12	24	10	-	1.0	0.5	-
	Kharif-1	Jute (O)	3.5±0.35	75	7	26	7	-	1.0	-	-
	Kharif-2	Mungbean	1.2±0.1	15	18	14	5	-	-	1.0	0.5
	Rabi	Lentil	1.5±0.15	15	18	15	5	-	1.0	0.5	0.5
		Chickpea/	1.5±0.5	15	18	15	5	-	1.0	0.5	0.5
	Kharif-1	B.Aus/	2.5±0.35	30	4	10	2	-	-	-	-
		Jute (0)	3.5±0.35	75	7	26	7	-	1.0	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Lentil	1.5±0.1	15	18	15	5	-	1.0	0.5	
	Kharif-1	Fallow/	-	-	-	-	-	-	-	-	-
		Jute (0)	3.5±0.35	75	7	26	7	-	1.0	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	5	15	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	6	18	7	-	1.0	-	-
	Rabi	Lentil	1.5±0.1	15	18	15	5	-	1.0	0.5	
	Kharif-1	Banana	25±3.0	135	20	66	32	-	1.0	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Cabbage/	52±5.0	40	36	15	12	-	1.5	0.5	0.5
		Cauliflower	20±2.0	60	22	32	7	-	1.0	0.5	0.5
	Kharif-1	Jute(0)/	3.5±0.35	75	7	20	5	-	1.0	-	-
		B.Aus(L)	2.5±0.3	30	4	10	2	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	B.Aus (LIV)/	2.5±0.25	30	6	12	4	-	-	-	-
		Jute (0)	3.5±0.5	75	10	30	10	-	1.0	-	-
	Kharif-2	Cotton	2.0±0.2	80	16	35	8	-	1	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Jute(0)/	3.5±0.35	75	10	30	10	-	1.0	-	-
		B.Aus(L)	2.5±0.5	30	6	12	4	-	-	-	-
	Kharif-2	Blackgram/	1.2±0.1	12	8	7	3	-	-	-	-
		Mungbean	1.0±0.1	15	18	14	5	-	-	-	-
	Irrigated										
	Rabi	Boro (MV)	6.0±0.6	120	14	36	8	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	18	6	-	0.5	-	-
	Rabi	Boro (MV)	4.8±0.5	95	10	27	7	-	1.0	-	-
	Kharif-1	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	40	5	18	6	-	0.5	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Wheat	3.5±0.35	90	16	38	4	-	-	1.0	-
	Kharif-1	T.Aus (MV)	3.2±0.3	54	4	15	5	-	1.0	-	-
	Kharif-2	Mungbean	1.0±0.1	15	18	14	5	-	-	-	-
	Rabi	Wheat	3.5±0.35	90	16	38	4	-	-	1.0	-
	Kharif-1	Jute (O)/	3.5±0.35	75	7	26	7	-	-	-	-
		B.Aus(LIV)/	2.5±0.3	30	4	10	2	-	-	-	-
		Mungbean	1.0±0.1	15	18	14	5	-	-	-	-
	Kharif-2	T.Aman(LIV)	3.0±0.3	45	5	15	6	-	1.0	-	-
	Rabi	Wheat	3.5±0.35	90	16	38	4	-	-	1.0	-
	Kharif-1	T.Aus (MV)	3.2±0.3	54	4	15	5	-	1.0	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Wheat/	3.5±0.35	90	16	38	4	-	-	1.0	-
		Onion	16.0±1.6	90	30	60	20	-	-	1.0	-
	Kharif-1	T.Aus (MV)	3.2±0.3	54	4	15	5	-	1.0	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	5	15	6	-	0.5	-	-
		T.Aman (MV)	4.0±0.4	66	6	16	7	-	1.0	-	-
	Rabi	Potato	25.0±3	96	16	48	8	-	1.0	1.0	-
	Kharif-1	T.Aus (MV)	3.2±0.3	54	4	11	5	-	0.5	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Potato	25±2.5	96	16	48	8	-	1.0	1.0	-
	Kharif-1	Maize	5.0±0.5	105	15	25	14	-	-	-	-
	Kharif-2	T.Aman(LIV)	3.0±0.3	45	5	11	6	-	1.0	-	-
	Rabi	Potato	25±2.5	96	16	48	8	-	1.0	1.0	-
	Kharif-1	Fallow									
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	11	6	-	1.0	-	-
	Rabi	Potato	25±2.5	96	16	38	8	-	1.0	1.0	-
	Kharif-1	Jute (O)	3.5±0.35	75	7	20	5	-	-	-	
	Kharif-2	Mungbean	1.0±0.1	15	18	10	10	-	-	-	-
	Rabi	Mustard	1.6±0.16	84	18	33	10	-	0.5	1.0	-
	Kharif-1	Jute (O)	3.0±0.35	75	7	26	7	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	15	6	-	1.0	-	-
	Rabi	Tomato	64.0±6.4	84	20	27	8	-	1.0	1.0	0.5
	Kharif-1	T.Aus (MV)	3.2±0.3	54	4	11	4	-	1.0	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Sugarcane	100.0±10	150	50	90	34	-	3.5	-	-
	Rabi	Sugarcane +	100.0±10	150	50	90	34	-	3.5	-	-
		Onion	8.0±0.8	75	30	75	30	-	-	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Sugarcane +	100.0±10	150	50	90	34	-	3.5	-	-
		Potato	10.0±1	70	15	60	-	-	-	-	-
	Rabi	Sugarcane +	100.0±10	150	50	90	34	-	3.5	-	-
		Lentil/Mungbean	0.5±0.1	10	12	8	-	-	-	-	-
Land type:	**Rainfed**										
Medium	Rabi	Wheat	2.5±0.25	45	10	18	3	-	0.5	0.5	-
Highland	Kharif-1	Jute (0)/	3.5±0.35	75	7	26	7	-	-	-	-
O.M: Low		B.Aus (LIV)	2.5±0.25	30	4	10	2	-	-	-	-
pH: 6.1-7.9	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	5	15	6	-	1.0	-	-
Texture: Loamy		T.Aman (MV)	4.0±0.4	66	6	18	7	-	1.0	-	-
K-bearing minerals:	Rabi	Wheat	2.5±0.25	45	10	18	3	-	0.5	1.0	-
Medium	Kharif-I	Mungbean	1.2±0.1	15	18	14	5	-	-	0.5	0.5
	Kharif-2	T.Aman (MV)	4.0±0.4	66	6	18	7	-	1.0	-	-
	Rabi	Mustard	1.0±0.1	60	12	24	10	-	1.0	0.5	-
	Kharif-1	Jute (0)/	3.5±0.35	75	7	26	7	-	-	-	-
		B.Aus (LIV)	2.5±0.25	30	4	10	2	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	5	15	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	6	18	7	-	1.0	-	-
	Rabi	Chickpea/	1.5±0.15	15	18	15	5	-	0.5	0.5	-
		Grasspea	1.2±0.1	12	6	7	4	-	-	-	-
	Kharif-1	B.Aus (LIV)/	2.5±0.25	30	4	10	2	-	-	-	-
		Jute(0)	3.5±0.35	75	7	26	7	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	5	15	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	6	18	7	-	1.0	-	-
	Rabi	Lentil	1.5±0.15	15	18	15	5		1.0	0.5	0.5
	Kharif-1	B.Aus (LIV)/	2.5±0.25	30	4	10	2	-	-	-	-
		Jute(0)	3.5±0.35	75	7	26	7	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	5	15	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	60	6	18	7	-	1.0	-	-
	Rabi	Onion	10±1.0	65	22	44	14	-	1.0	0.5	-
	Kharif-1	Sesame	1.0±0.1	54	9	11	5	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	6	13	6	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	B.Aus (LIV)/	2.5±0.25	30	6	12	4	-	-	-	-
		Jute (0)	3.5±0.35	75	10	30	10	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	15	6	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
		Jute (0)	3.5±0.35	75	10	30	5	-	-	-	-
	Kharif-1	T.Aus (MV)	3.2±0.3	54	6	17	4	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	6	18	7	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Irrigated											
Rabi	Boro (MV)		6.0±0.6	120	14	36	8	-	1.0	-	-
Kharif-1	Fallow		-	-	-	-	-	-	-	-	-
Kharif-2	T.Aman (MV)		4.0±0.4	66	5	18	6	-	0.5	-	-
Rabi	Boro (MV)		4.8±0.5	96	10	27	7	-	1.0	-	-
Kharif-1	GM		-	-	-	-	-	-	-	-	-
Kharif-2	T.Aman (MV)		4.0±0.4	40	5	18	6	-	0.5	-	-
Rabi	Boro (MV)		4.8±0.5	96	10	27	7	-	1.0	-	-
Kharif-1	T.Aus (MV)		3.5±0.4	54	4	15	5	-	-	-	-
Kharif-2	T.Aman (MV)		4.0±0.4	66	5	18	6	-	1.0	-	-
Rabi	Wheat		3.5±0.35	90	16	38	4	-	1.0	1.0	-
Kharif-1	Fallow/		-	-	-	-	-	-	-	-	-
	T.Aus (MV)		3.2±0.3	54	4	15	5	-	-	-	-
Kharif-2	T.Aman (MV)		4.0±0.4	66	5	18	6	-	1.0	-	-
Rabi	Wheat		3.5±0.35	90	16	38	8	-	-	1.0	-
Kharif-1	GM		-	-	-	-	-	-	-	-	-
Kharif-2	T.Aman (MV)		4.0±0.4	40	5	18	6	-	1.0	-	-
Rabi	Wheat		3.5±0.35	90	16	38	4	-	1.0	1.0	-
Kharif-1	Mungbean		1.0±0.1	15	18	14	5	-	-	-	0.5
Kharif-2	T.Aman (MV)		4.0±0.4	66	5	18	6	-	1.0	-	-
Rabi	Wheat		3.5±0.35	90	16	38	4	-	1.0	1.0	-
Kharif-1	Blackgram/		1.2±0.1	12	8	7	3	-	-	-	0.5
	Jute(0)		3.5±0.35	75	7	26	7	-	1.0	-	-
Kharif-2	T.Aman (MV)		4.0±0.4	66	5	18	6	-	1.0	-	-
Rabi	Wheat/		3.5±0.35	90	16	38	4	-	1.0	1.0	-
Rabi	Mustard		1.6±0.16	84	18	33	14	-	1.0	1.0	-
Kharif-1	Lady's finger		12±1.2	63	16	21	5	-	-	-	-
Kharif-2	T.Aman (MV)		4.0±0.4	66	5	14	6	-	1.0	-	-
Rabi	Maize		8.0±0.8	195	36	57	24	-	2.0	1.0	-
Kharif-1	Fallow		-	-	-	-	-	-	-	-	-
Kharif-2	T.Aman (MV)		4.0±0.4	66	5	14	6	-	1.0	-	-
Rabi	Maize		8.0±0.8	195	36	57	24	-	2.0	1.0	-
Kharif-1	GM		-	-	-	-	-	-	-	-	-
Kharif-2	T.Aman (MV)		4.0±0.4	40	5	14	6	-	1.0	-	-
Rabi	Potato		25.0±2.5	96	16	48	8	-	1.5	1.0	-
Kharif-1	T.Aus (MV)/		3.2±0.3	54	4	11	5	-	-	-	-
	Jute(0)		3.5±0.35	75	7	20	5	-	-	-	-
Kharif-2	T.Aman (MV)		4.0±0.4	66	5	14	6	-	1.0	-	-
Rabi	Potato		25±2.5	96	16	48	8	-	1.5	1.0	-
Kharif-1	GM		-	-	-	-	-	-	-	-	-
Kharif-2	T.Aman (MV)		4.0±0.4	40	5	14	6	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Mustard (LIV)	1.6±0.1	84	18	33	14	-	1.0	1.0	-
	Kharif-1	Jute (0)	3.5±0.35	75	7	26	7	-	-	-	-
		T.Aus (MV)	3.2±0.4	54	4	15	5	-	1.0	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	18	6	-	1.0	-	-
	Rabi	Onion	16±1.6	90	30	60	20	-	1.0	1.0	-
	Kharif-1	T.Aus (MV)/	3.2±0.3	54	4	11	5	-	1.0	-	-
		Jute (0)	3.5±0.35	75	7	20	5	-	1.0	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	14	6	-	1.0	-	-
	Rabi	Onion/	16±2.0	90	30	60	20	-	1.0	-	-
		Garlic	10.0±1.0	90	30	60	20	-	1.0	-	-
	Kharif-1	Sesame	1.0±0.1	54	7	8	5	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	14	6	-	1.0	-	-
	Rabi	Tomato	64±6.4	84	20	27	8	-	1.0	1.0	-
	Kharif-1	T.Aus (MV)	3.2±0.3	54	4	11	5	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	14	6	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	T.Aus (MV)/	2.8±0.3	36	6	8	4	-	1.0	-	-
		Jute (O)	3.5±0.35	75	10	30	10	-	1.0	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	5	15	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	6	18	6	-	1.0	-	-
Land type: Medium Lowland O.M: Medium pH 6.1-7.9 texture : Clayey K-bearing minerals: High	**<u>Rainfed</u>**										
	Rabi	Grasspea	1.2±0.1	10	6	7	-	-	-	0.5	-
	Kharif	B.Aus+B.Aman	2.8±0.3	35	5	15	5	-	1.0	-	-
	Rabi	Grasspea	1.2±0.1	10	6	7	4	-	-	0.5	-
		Mustard	1.0±0.1	50	12	24	10	-	1.0	0.5	-
	Kharif	B.Aman	2.5±0.3	30	5	12	4	-	-	-	-
	Rabi	Onion	1.0±0.1	54	22	44	14	-	1.0	0.5	-
	Kharif	B.Aman	2.5±0.3	30	5	12	4	-	-	-	-
	Rabi	Lentil	1.5+0.15	15	18	15	10	-	1.0	1.0	-
	Kharif-1	Sesame	1.0±0.1	45	9	11	5	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	38	5	15	6	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	38	6	15	6	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Irrigated										
	Rabi	Boro (MV)	4.8±0.5	80	10	27	7	-	1.0	-	-
	Kharif	B.Aman (LIV)	2.5±0.3	30	5	12	4	-	-	-	-
	Rabi	Boro (MV)	4.8±0.5	80	10	27	7	-	1.0	-	-
	Kharif-1	Jute (C)/	2.8±0.3	35	5	18	6	-	1.0	-	-
		T.Aus (LIV)	2.8±0.3	30	4	11	4	-	1.0	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Boro (MV)	4.8±0.5	80	10	27	7	-	1.0	-	-
	Kharif-1	Lady's finger	12.0±1.2	63	16	21	5	-	1.0	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Boro (MV)	4.8±0.5	80	10	27	7	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	38	5	15	6	-	1.0	-	-
Land type:	**Rainfed**										
Lowland	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif	B.Aman	2.5±0.5	35	6	15	4	-	-	-	-
	Rabi	Boro (LIV)	4.5±0.5	40	10	25	8	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	20	3	11	6	-	1.0	-	-
	Irrigated										
	Rabi	Boro (MV)	4.8±0.5	80	10	27	7	-	1.0	-	-
	Kharif	B.Aman	2.5±0.5	35	6	15	4	-	-	-	-

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AEZ 12 : LOW GANGES RIVER FLOODPLAIN

LAND TYPES

Highland	- 13%
Medium Highland	- 29%
Medium Lowland	- 31%
Lowland	- 14%
Very lowland	- 2%
Homestead + Water	- 11%

LOCATION AND EXTENTS:

Natore, Pabna, Goalanda, Faridpur, Madaripur, Gopalganj and Sariatpur eastern parts of Kushtia, Magura and Narail, north-eastern parts of Khulna and Bogerhat, northern Barisal, and sourth-western parts of Manikganj, Dhaka and Mushiganj districts
7968 km^2 (796851 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Highland O.M: Medium pH: 6.2-7.7 Texture: Silt Loam K-bearing minerals: Medium	**Rainfed**										
	Rabi	Sugarcane	80.0±8.0	112	30	52	28	-	3.0	-	-
	Rabi	Wheat	2.5±0.25	45	10	12	3	-	0.5	0.5	-
	Kharif-1	B. Aus (LIV)/	2.5±0.25	30	4	7	2	-	-	-	-
		Jute (0)	3.5±0.35	75	7	18	5	-	1.0	-	-
	Kharif-2	Gourd	26±2.6	45	14	18	12	-	-	-	-
	Rabi	Mustard	1.0±0.1	60	12	16	10	-	1.0	0.5	-
	Kharif-1	Jute (0)/	3.6±0.35	75	7	18	5	-	-	-	-
		B.Aus (LIV)	2.5±0.3	30	4	7	2	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	5	10	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	5	12	6	-	1.0	-	-
	Rabi	Mustard	1.0±0.1	60	12	16	10	-	1.0	0.5	-
	Kharif-1	Sesame	1.0±0.1	54	9	10	5	-	-	-	-
	Kharif-2	Mungbean	1.0±0.1	15	18	9	5	-	-	0.5	-
	Rabi	Mustard	1.0±0.1	60	12	16	10	-	1.0	0.5	-
	Kharif-1	T.Aus (MV)	3.2±0.3	54	4	10	4	-	1.0	-	-
	Kharif-2	Gourd	26±2.6	45	14	18	12	-	-	-	-
	Rabi	Lentil	1.5±0.1	15	18	10	5	-	1.0	0.5	-
	Kharif-I	B.Aus (LIV)/	2.5±0.5	30	4	7	2	-	-	-	-
		Jute(0)	3.5±0.35	75	5	18	5	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	10	6	-	1.0	-	-
	Rabi	Lentil	1.5±0.15	15	18	10	5	-	-	-	-
	Kharif-1	Jute(0)	3.5±0.35	75	7	18	5	-	2	-	-
	Kharif-2	Gourd	26±2.6	45	14	18	12	-	-	-	-
	Rabi	Onion/	10±1.0	65	22	28	14	-	1.0	0.5	-
		Garlic	7±0.7	65	22	28	14	-	1.0	-	-
	Kharif-1	Jute(0)	3.5±0.35	75	7	13	5	-	1.0	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Brinjal	34±3.4	60	12	14	6	-	1.0	0.5	-
	Kharif-1	Jute(0)/	3.5±0.35	75	7	13	5	-	1.0	-	-
		B.Aus(LIV)	25±0.25	30	4	5	2	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Irrigated										
	Rabi	Wheat	3.5±0.35	90	16	26	4	-	-	1.0	-
	Kharif-1	Jute (0)	3.5±0.35	75	7	18	7	-	1.0	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	5	8	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	6	12	7	-	1.0	-	-
	Rabi	Onion	16.0±1.6	90	30	-	20	-	1.0	-	-
	Kharif-1	T. Aus (MV)	32±0.3	54	4	8	7	-	1.0	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	5	8	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	65	6	10	7	-	1.0	-	-
Land Type: Medium Highland O.M: Medium pH: 6.2-7.7 Texture: Silty Loam K-bearing minerals: Medium	**Rainfed**										
	Rabi	Wheat	2.5±0.25	45	10	12	3	-	0.5	0.5	-
	Kharif-1	Fallow/	-	-	-	-	-	-	-	-	-
		Jute (C)/	2.8±0.3	42	5	12	3	-	1.0	-	-
		Kaon	2.5±0.25	45	8	9	2	-	-	-	-
	Kharif-2	T.Aman(LIV)	3.0±0.3	45	5	8	6	-	1.0	-	-
	Rabi	Wheat	2.5±0.25	45	10	12	3	-	0.5	0.5	-
	Kharif-1	Jute(O)	3.5±0.35	75	7	18	5	-	1.0	-	-
	Kharif-2	Blackgram	1.2±0.12	12	8	5	3	-	-	0.5	-
	Rabi	Mustard	1.2±0.1	60	12	16	10	-	1.0	0.5	-
	Kharif-1	Jute(O)/	3.5±0.35	75	7	18	5	-	-	-	-
		Aus (LIV)	2.5±0.25	30	4	7	2	-	1.0	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	8	6	-	1.0	-	-
	Rabi	Mustard	1.0±0.15	60	12	16	5	-	1.0	0.5	-
	Kharif-1	Chilli	1.3±0.13	65	28	22	7	-	1.0	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Lentil	1.5±0.15	15	18	10	5	-	0.5	0.5	0.5
	Kharif-1	Jute (O)	3.5±0.35	75	7	18	5	-	1.0	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Lentil/	1.5±0.15	15	18	10	5	-	0.5	0.5	0.5
		Chickpea	1.5±0.2	15	18	10	5	-	0.5	0.5	0.5
	Kharif-1	B.Aus(LIV)/	2.5±0.3	30	4	7	2	-	1.0	-	-
		T. Aus (MV)/	2.8±0.3	36	6	7	5	-	1.0	-	-
		Jute(O)	3.5±0.35	75	7	18	5	-	1.0	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	8	6	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Onion/	10±1.0	95	22	28	14	-	1.0	0.5	-
		Garlic	7.0±0.7	65	22	28	14	-	1.0	-	-
	Kharif-1	T. Aus(MV)	2.8±0.3	36	6	5	5	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	8	6	-	1.0	-	-
	Irrigated										
	Rabi	Sugarcane	100±10	140	36	65	35	-	-	3.5	-
	Rabi	Boro (MV)	6.0±0.6	120	14	24	8	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	5	12	6	-	1.0	-	-
	Rabi	Boro (MV)	4.8±0.5	96	10	18	7	-	1.0	-	-
	Kharif-1	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	40	5	12	6	-	1.0	-	-
	Rabi	Wheat	3.5±0.35	90	16	26	4	-	1.0	0.5	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	5	8	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	6	12	7	-	1.0	-	-
	Rabi	Wheat	3.5±0.35	90	16	25	8	-	1.0	0.5	-
	Kharif-2	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	4	4	7	-	1.0	-	-
	Rabi	Wheat	3.5±0.35	90	16	25	8	-	1.0	0.5	-
	Kharif-1	Jute (O)/	3.5±0.35	75	7	18	5	-	1.0	-	-
		B.Aus (LIV)	2.5±0.3	30	4	7	2	-	-	-	-
	Kharif-2	Mungbean	1.0±0.1	15	18	9	5	-	-	-	-
	Rabi	Wheat	3.5±0.35	90	16	26	4	-	1.0	0.5	-
	Kharif-1	Jute (0)	3.5±0.35	75	7	18	5	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	6	12	7	-	1.0	-	-
	Rabi	Potato	25.0±2.5	96	16	32	8	-	1.5	0.5	-
	Kharif-1	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman(MV)	4.0±0.4	40	5	14	6	-	1.0	-	-
	Rabi	Potato	25 ±2.5	96	16	32	8	-	1.5	0.5	-
	Kharif-1	T. Aus(MV)	2.8±0.3	36	6	5	4	-	1.0	-	-
	Kharif-2	Gourd	40±4.0	60	18	18	12	-	-	-	-
		T.Aman (LIV)	3.0±0.3	45	5	8	6	-	1.0	-	-
	Rabi	Mustard	1.6±0.1	84	18	22	14	-	1.0	0.5	-
	Kharif-1	T. Aus (MV)	3.2±0.3	54	4	10	5	-	1.0	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	6	12	7	-	1.0	-	-

Hasan

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Cabbage	80±8.0	126	50	14	16	-	2.0	0.5	-
	Kharif-1	Jute(O)	3.5±0.35	75	7	13	5	-	1.0	-	-
	Kharif-2	Gourd	40.0±4.0	60	18	18	12	-	0.6	-	-
Land type: Medium Lowland O.M.: Medium pH: 6.2-7.4 Texture: K-bearing minerals: High	**Rainfed**										
	Rabi	Wheat	2.5±0.25	38	9	12	3	-	1.0	0.5	-
	Kharif-1	Jute (O)	3.5±0.35	62	8	18	5	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	55	7	12	6	-	1.0		-
	Rabi	Wheat	2.5±0.25	38	9	12	3	-	1.0	0.5	-
	Kharif	B.Aus+B.Aman	2.8±0.3	30	6	10	5	-	-	-	-
	Rabi	Lentil/	1.2±0.1	12	22	10	5	-	1.0	0.5	0.5
		Chickpea	1.2±0.1	12	22	10	5	-	1.0	0.5	0.5
	Kharif	B.Aus+B.Aman	2.8±0.3	30	6	10	5	-	-	-	-
	Rabi	Lentil /	1.2±0.1	12	22	10	5	-	1.0	0.5	-
		Chickpea	1.2±0.1	12	22	10	5	-	-	-	-
	Kharif-1	Jute (O)	3.5±0.35	62	8	18	5	-	-	-	-
	Kharif-2	Mungbean/	1.2±0.1	12	22	10	5	-	-	0.5	-
		Blackgram	1.2±0.1	12	10	5	2	-	-	-	-
	Rabi	Groundnut	2.0±0.2	28	26	18	14	-	1.5	0.5	0.5
	Kharif	B.Aus + B.Aman	2.8±0.3	30	6	10	5	-	-	-	-
	Irrigated										
	Rabi	Boro (MV)	4.8±0.5	80	13	18	6	-	1.0	-	-
	Kharif	B.Aman	2.5±0.3	25	5	6	4	-	-	-	-
	Rabi	Boro (MV)	4.8±0.5	80	13	18	6	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	38	5	11	6	-	1.0	-	-
	Rabi	Wheat	3.5±0.35	75	20	25	4	-	1.0	1.0	-
	Kharif-1	Jute(C)/	2.8±0.3	36	7	12	5	-	1.0	-	-
		B.Aus (LIV)	2.5±0.3	25	5	6	4	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Wheat	3.5±0.35	75	20	25	4	-	1.0	1.0	-
	Kharif	B. Aus + B.Aman	2.8±0.3	30	6	10	5	-	1.0	-	-
	Rabi	Mustard	1.6±0.1	70	23	22	14	-	1.0	1.0	-
		Boro	2.8±0.5	80	8	16	6	-	1.0	-	-
	Kharif	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Potato	25±2.5	80	20	32	8	-	1.5	1.0	-
	Kharif-1	Jute (C)	2.8±0.3	36	7	8	5	-	1.0	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Onion	16.0±.1.6	75	38	40	20	-	1.0	1.0	-
	Kharif-1	Jute (C)	2.8±0.3	36	7	9	5	-	1.0	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Onion	16±1.6	75	38	40	20	-	1.0	1.0	-
	Kharif	B.Aus+B.Aman	2.8±0.3	30	6	10	5	-	1.0	-	-
Land type:	**Rainfed**										
Lowland	Rabi	Boro (LIV)	3.0±0.3	38	8	11	6	-	1.0	-	-
	Kharif	B.Aman (LIV)	2.5±0.3	25	5	6	4	-	-	-	-
	Rabi	Chickpea	1.5±0.2	12	22	10	10	-	1.0	0.5	0.5
	Kharif	B.Aman (LIV)	2.5±0.3	25	5	6	4	-	-	-	-
	Rabi	Sesame	1.0±0.1	45	18	18	10	-	1.0	-	-
	Kharif-1	B. Aus +B. Aman	2.8±0.3	30	6	10	5	-	-	-	-
	Irrigated										
	Rabi	Boro (MV)	4.8±0.5	80	13	18	6	-	1.0	-	-
	Kharif	B.Aman (LIV)	2.5±0.3	25	5	6	4	-	1.0	-	-
	Rabi	Onion	16±1.6	75	38	40	20	-	1.0	0.5	
	Kharif-2	B.Aman (LIV)	2.5±0.3	25	5	6	4	-	1.0	-	-

Hasan

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AEZ 13 : GANGES TIDAL FLOODPLAIN

LAND TYPES

Highland	- 2%
Medium Highland	- 78%
Medium Lowland	- 2%
Homestead + Water	- 18%

LOCATION AND EXTENTS:

The region occupies all or most of Barisal, Jhalakati, Pirojpur, Patuakhali, Barguna, Bogerhat, Khulna and Satkhira districts. It includes the Khulna and Bagerhat, Sundarbans Reserved Forests 17066 Km^2(1706573 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land type: Medium Highland Lowland O.M.: Medium pH: 6.5-7.0 Texture: Loamy K-bearing minerals: Medium	**Rainfed (Non Saline)**										
	Rabi	Wheat	2.5±0.25	45	16	6	1.5	-	0.5	-	-
	Kharif-1	B.Aus(LIV)	2.5±0.25	30	6	4	1	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	6	4	1.5	-	0.5	-	-
		T.Aman (MV)	4.0±0.4	66	8	6	1.5	-	0.5	-	-
	Rabi	Mustard/	1.0+0.1	60	18	8	3	-	1.0	0.5	-
		Groundnut	2.0+0.2	33	30	9	4	-	1.0	0.5	-
	Kharif-1	B.Aus (LIV)	2.5±0.3	30	4	4	1	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.2±0.3	45	6	4	1.5	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	8	6	1.5	-	1.0	-	-
	Rabi	Mungbean	1.2±0.1	15	27	5	3	-	1.0	0.5	-
	Kharif-1	B.Aus (LIV)/	2.5±0.25	30	6	4	1	-	-	-	-
		T.Aus (LIV)/	2.8±0.3	36	6	4	1	-	-	-	-
		T.Aus (MV)	3.5±0.3	54	6	5	1	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	6	4	1.5	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	8	6	1.5	-	1.0	-	-
	Rabi	Grasspea	1.2±0.1	12	9	2	1	-	-	0.5	-
	Kharif-1	B.Aus(L)/	2.5±0.25	25	5	3	1	-	-	-	-
		T.Aus (LIV)	2.8±0.3	36	6	4	1	-	1.0	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	6	4	1.5	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	8	6	1.5	-	1.0	-	-
	Rabi	Chilli	1.3±0.1	65	43	11	2	-	1.0	0.5	-
	Kharif-1	B.Aus(LIV)	2.5±0.25	30	6	4	1	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	4	4	1.5	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	8	6	1.5	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	T.Aus (LIV)	2.8±0.3	36	9	4	1	-	1.0	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	6	4	1.5	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	8	6	1.5	-	1.0	-	-

Hasan

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Irrigated (Non-saline)										
	Rabi	Boro (MV)	6.0±0.6	120	22	11	2	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	Fallow/	-	-	-	-	-	-		--	
		T.Aman (MV)	4.0±0.4	66	8	6	2	-	1.0	-	-
	Rabi	Mustard	1.2±0.1	54	18	8	2	-	1.0	0.5	-
		Boro (MV)	4.8±0.5	96	15	9	2	-	1.0		
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	8	6	2	-	1.0	-	-
	Rabi	Melon	28.0±2.8	70	25	9	3	-	1.0	-	-
		T.aus(MV)	3.2±0.3	54	6	5	1	-	-	-	-
		T.Aman (MV)	4.0±0.4	66	8	6	2	-	1.0	-	-
Land type: Medium Highland Lowland O.M.: Medium pH: 6.5-7.0 Texture: Loamy K-bearing minerals: Medium	**Rainfed (Saline)**										
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	8	4	1.5	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	10	6	1.5	-	1.0	-	-
	Rabi	Water Melon/	18.0±1.8	50	18	7	2	-	1.0	-	-
		Mungbean/	1.2±0.1	15	18	5	2	-	1.0	0.5	-
		Cowpea/	1.0±0.1	12	7	2	1	-	1.0	0.5	-
		Chilli	1.3±0.1	36	40	10	2	-	1.0	0.5	-
	Kharif-1	T.Aus (LIV)	2.8±0.3	30	6	4	1	-	-	-	-
	Khaif-2	T.Aman (LIV)	3.0±0.3	45	6	1	1.5	-	1.0	-	-

Hasan

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AEZ 14 : GOPALGANJ-KHULNA BILS

LAND TYPES

Highland	- 3%
Medium Highland	- 13%
Medium Lowland	- 41%
Lowland	- 28%
Very Lowland	- 11%
Homestead + Water	- 4%

LOCATION AND EXTENTS:

The region occupies a number separate basin areas in Madaripur Gopalganj, Narail, Jessore Bagerhat and Khulna districts 2247 Km^2(224700 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land type: Medium Highland O.M.: Medium pH: 5.0-7.7 Texture: Clayey K-bearing minerals: High	**Rainfed**										
	Rabi	Wheat/	2.5±0.25	8	12	6	-	-	1.0	-	-
		Mustard	1.0±0.1	10	17	8	-	-	1.0	-	-
	Kharif-1	Jute(C)	2.8±0.3	7	6	6	-	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Sesame	1.0±0.1	10	17	5	-	-	0.5	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	8	4	5	-	-	0.5	-	-
		T.Aman (MV)	4.0±0.4	11	6	6	-	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Jute(C)	2.8±0.3	7	10	7	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	8	4	5	-	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	11	6	6	-	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	B.Aus(L)	2.5±0.25	5	8	4	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	8	4	5	-	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	11	6	6	-	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman(LIV)	3.0±0.3	8	6	-	-	-	1.0	-	-
	Rabi	Country bean	16.0±1.6	10	18	6	-	-	1.0	-	-
	Kharif-1	Ind.Spinach	20.0±2.0	8	5	7	-	-	-	-	-
	Kharif-2	B.Gourd	26.0±2.6	7	11	10	-	-	-	-	-
	Irrigated										
	Rabi	Boro (MV)	6.0±0.6	20	18	-	-	-	1.5	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	8	4	5	-	-	-	-	-

Hasan

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Wheat	3.5±0.35	15	20	12	-	-	1.0	0.5	-
	Kharif-1	Sesame/	1.0±0.1	10	8	5	-	-	-	-	-
		Jute(C)	2.8±0.3	7	6	6	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	11	6	6	-	-	-	-	-
Land type: Medium Lowland O.M.: pH: Texture: K-bearing minerals:	**Rainfed**										
	Rabi	Grasspea	1.2+0.1	4	8	4	-	-	-	0.5	-
	Kharif	B.Aus+B.Aman	2.8±0.3	15	6	5	5	-	1.0	-	-
	Rabi	Mustard	1.6±0.16	14	22	11	3	-	1.0	0.5	-
	Kharif	B.Aman	2.5±0.3	12	5	4	-	-	-	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman(LIV)	3.0±0.3	8	8	6	-	-	1.0	-	-
	Irrigated										
	Rabi	Boro (MV)	4.8±0.5	16	12	9	-	-	1.5	-	-
	Kharif	DWT.Aman	2.5±0.3	12	5	4	-	-	-	-	-
Land type: Lowland O.M.: Texture: K-bearing minerals:	**Rainfed**										
	Rabi	Boro (LIV)	3.0±0.3	8	4	5	-				
	Kharif	B.Aman (LIV)	2.5±0.3	12	5	4	-	-	-	-	-
	Irrigated										
	Rabi	Boro (MV)	4.8±0.5	16	12	9	-	-	1.5	-	-
	Kharif	Fallow	-	-	-	-	-	-	-	-	-
Land type: Very Lowland O.M.: Texture: K-bearing minerals:	**Rainfed**										
	Rabi	Boro (LIV)	3.0±0.3	8	4	5	-	-	-	-	-
	Kharif	B.Aman (LIV)	2.5±0.3	12	5	4	-	-	-	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif	B.Aman (LIV)	2.5±0.3	12	5	4	4	-	-	-	-
	Irrigated										
	Rabi	Boro (MV)	4.8±0.5	16	12	9	-	-	1.5	-	-
	Kharif	Fallow	-	-	-	-	-	-	-	-	-

Hasan

Uploaded by: Mirza Hasanuzzaman, Department of Agronomy, SAU

AEZ 15 : ARIAL BIL

LAND TYPES

Medium Lowland	- 13%
Lowland	- 73%
Homestead + Water	- 14%

LOCATION AND EXTENTS:

Munshiganj and Dhaka district
144 km^2 (14436 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land type: Medium Lowland O.M.: Medium pH: 5.4 Texture: Clayey K-bearing minerals: Medium	**Rainfed**										
	Rabi	Potato	20+0.2	58	12	22	4	-	1.0	0.5	-
	Kharif-I	Jute (C)	2.8+0.3	36	4	8	2	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Grasspea	1.0+0.1	10	6	4	2	-	-	0.5	-
	Kharif	B.Aus+B.Aman	2.5+0.3	10	5	6	4	-	1.0	-	-
	Rabi	Mustard	1.0+0.1	50	16	16	6	-	-	-	-
	Kharif	B.Aus+B.Aman	2.5+0.3	10	5	6	4	-	1.0	-	-
	Irrigated										
	Rabi	Boro (MV)	4.8+0.5	80	10	18	4	-	1.0	-	-
	Kharif	Fallow	-	-	-	-	-	-	-	-	-
Land type: Lowland O.M.: Medium pH: 5.4 Texture: Clayey K-bearing minerals: Medium	**Irrigated**										
	Rabi	Boro (MV)	4.8+0.5	80	10	18	4	-	1.0	-	-
	Kharif	Fallow	-	-	-	-	-	-	-	-	-

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AEZ 16 : MIDDLE MEGHNA RIVER FLOODPLAIN

LAND TYPES

Medium Highland	- 8%
Medium Lowland	- 29%
Lowland	- 25%
Very Lowland	- 11%
Homestead + Water	- 27%

Brahmanbaria,

LOCATION AND EXTENTS:

The region occurs between the southern part of the Sylhet Basin and the confluence of the Meghna river with the Dhaleshwari and Gonges rivers. It covers parts of several districts: Kishorganj, Comilla, Chandpur, Narsingdi and Narayanganj

1555 km^2 (155464 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Medium Lowland O.M.: Low pH: 5.9-5.5 Texture: Loam K-bearing minerals: Low	**Rainfed**										
	Rabi	Wheat	2.5+0.25	38	10	30	2	-	1.0	0.5	-
	Kharif-I	Jute (C)	2.8+0.2	36	5	28	2	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Mustard	1.0+0.1	50	12	40	6	-	-	0.5	-
	Kharif	B.Aus+B.Aman	2.8+0.3	35	6	25	8	-	1.0	-	
	Rabi	Mustard	1.0+0.1	50	12	40	6	-	-	0.5	-
	Kharif	B.Aman	2.5+0.3	25	5	20	2	-	-	-	-
	Irrigated										
	Rabi	Boro (MV)	4.8+0.5	80	10	45	4	-	1.0	-	-
	Kharif	B.Aman	2.5+0.3	25	5	20	2	-	-	-	-
Land Type: Lowland O.M.: Low pH: 5.9-5.5 Texture: Loam K-bearing minerals: Low	**Rainfed**										
	Rabi	Potato	20.0+2.0	48	12	58	3	-	1.5	-	-
	Kharif	B.Aman(L)	2.5+0.3	25	5	20	4	-	-	-	-
	Rabi	Grasspea	1.0+0.1	10	7	10	2	-	1.0	-	-
	Kharif	B.Aman(L)	2.5+0.3	25	5	20	4	-	-	-	-
	Irrigated										
	Rabi	Boro (MV)	4.8+0.5	80	10	45	4	-	1.0	-	-
	Kharif	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Potato	25.0+2.5	80	16	80	4	-	-	-	-
	Kharif	B.Aman (L)	2.5+0.3	25	5	20	4	-	-	-	-

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AEZ 17 : LOWER MEGHNA RIVER FLOODPLAIN

LAND TYPES

Highland	- 14%
Medium Highland	- 28%
Medium Lowland	- 31%
Homesteads+Water	- 27%

LOCATION AND EXTENTS:

Chandpur, Lakshimpur and Noakhali districts
909 km^2 (90934 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Highland O.M.: Medium pH: 5.0-6.0 Texture: Silt Loam K-bearing minerals: Low	**Rainfed**										
	Rabi	Lentil/	1.5±0.1	15	18	20	5	-	0.5	0.5	0.5
		Mustard	1.0±0.1	60	12	32	10	-	1.0	0.5	-
	Kharif-1	B.Aus (LIV)	2.5±0.25	30	4	14	2	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
		T.Aman (LIV)	3.0±0.3	45	4	19	6	-	1.0	-	-
	Rabi	Chilli/	1.3±0.1	65	28	43	10	-	-	0.5	-
		Radish/	32.0±3.2	76	17	50	8	-	-	0.5	-
		Tomato	40±4.0	60	14	26	6	-	1.0	0.5	-
	Kharif-1	Jute (C)/	2.8±0.28	42	5	15	3	-	-	-	-
		B.Aus(L)	2.5±0.25	25	4	9	2	-	-	-	-
	Kharif-2	Fallow/	-	-	-	-	-	-	-	-	-
		T.Aman (LIV)	3.0±0.3	45	4	13	6	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-I	B.Aus (LIV)	2.5±0.25	30	6	16	3	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	4	19	6	-	1.0	-	-
Land Type: Meduim highland O.M.: Medium pH: 5.0-6.0 Texture: Silt Loam K-bearing minerals: Low	**Rainfed**										
	Rabi	Wheat	2.5±0.25	38	10	24	3	-	-	0.5	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman(LIV)	3.0±0.3	38	4	19	6	-	1.0	-	-
	Rabi	Mustard	1.0±0.1	50	12	32	10	-	-	0.5	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	38	4	19	6	-	1.0	-	-
	Rabi	Groundnut	2.0+0.2	27	20	36	14	-	-	0.5	0.5
	Kharif-1	B.Aus (LIV)/	2.5±0.25	30	4	14	2	-	-	-	-
		Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	56	4	22	6	-	1.0	-	-
	Rabi	Soybean	1.6±0.16	15	17	30	9	-	0.5	0.3	0.5
	Kharif-1	B.Aus (LIV)/	2.5±0.25	26	4	14	2	-	-	-	-
		Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	38	4	19	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	56	4	22	6	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Chilli	2.0±0.2	75	40	60	10	-	1.0	0.5	-
	Kharif-1	B.Aus (L)/	2.5±0.25	25	5	10	2	-	-	-	-
		T.Aus (MV)	2.8±0.3	30	3	10	2	-	1.0	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	38	4	13	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	56	4	15	6	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	T.Aus (MV)	3.2±0.3	45	6	22	4	-	1.0	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	38	4	10	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	56	4	22	6	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	56	8	22	7	-	1.0	-	-
	Rabi	Lentil/	1.5±0.15	15	18	20	8	-	-	0.5	0.5
		Chickpea	2.0±0.2	15	18	20	8	-	-	0.5	0.5
	Kharif-1	B. Aus/(LIV)	2.5±0.25	26	4	14	2	-	-	-	-
		Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	56	4	22	6	-	1.0	-	-
	Irrigated										
	Rabi	Boro (MV)	6.0±0.6	100	14	46	8	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	38	4	19	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	56	4	22	6	-	1.0	-	-
	Rabi	Mustard(LIV)	1.2±0.1	45	12	30	8	-	-	1.0	-
		Boro(HYV)	4.8±0.5	80	5	36	6	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	37	4	19	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	56	4	22	6	-	1.0	-	-
Land Type: Medium Lowland O.M.: Medium pH: 5.0-6.0 Texture: Silt Loam K-bearing minerals: Medium	**Rainfed**										
	Rabi	Wheat/	2.5±0.5	38	10	24	3	-	-	-	-
		Potato	20.0±2.0	58	12	46	8	-	1.0	-	-
	Kharif-1	Jute (C)/	2.8±0.3	36	4	26	3	-	-	-	-
		Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	38	4	13	6	-	1.0	-	-
	Rabi	Mustard	1.6±0.16	70	18	44	14	-	-	0.5	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	38	4	13	6	-	1.0	-	-
	Irrigated										
	Rabi	Boro (MV)	4.8±0.5	80	10	36	6	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	38	4	13	6	-	1.0	-	-

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AEZ 18 : YOUNG MEGHNA ESTUARINE FLOODPLAIN

LAND TYPES

Medium Highland	- 45%
Medium Lowland	- 7%
Homesteads +Water	- 48%

LOCATION AND EXTENTS:

Chittagong, Feni, Noakhali, Lakshmipur, Bhola, Barisal, Patuakhali and Barguna district

9269 km^2 (926885 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Medium Highland O.M.: Low pH: 6.1-6.8 Texture: Silt Loam K-bearing minerals: Medium	**Rainfed**										
	Rabi	Wheat	2.5±0.5	45	10	12	1.5	-	-	-	-
	Kharif-I	B.Aus(LIV)	2.5±0.25	30	3	7	1	-	-	-	-
		D.Aus (MV)	3.2±0.3	54	3	10	2				
	Kharif-2	T.Aman(LIV)	3.0±0.3	45	3	10	3	-	1.0	-	-
	Rabi	Mustard	1.0±0.1	60	13	16	6	-	-	-	-
	Kharif-I	B.Aus (LIV)	2.5±0.25	30	3	7	1	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	10	3	-	1.0	-	-
	Rabi	Soybean	1.6±0.16	18	17	16	5	-	0.5	-	0.5
	Kharif-I	D.Aus (MV)	3.2±0.3	54	3	10	2				
	Kharif-2	T.Aman(LIV)	3.0±0.3	45	3	10	3	-	1.0	-	-
	Rabi	Groundnut	2.0±0.2	33	20	18	7	-	-	-	-
	Kharif-I	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	10	3	-	1.0	-	-
	Rabi	Grasspea	1.2±0.1	12	6	4	1	-		-	-
	Kharif-I	B.Aus (LIV)	2.5±0.25	30	3	7	1	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	10	3	-	1.0	-	-
	Rabi	Cowpea/	1.0±0.1	12	6	4	1	-	-	-	-
		Lentil	1.0±0.1	12	18	10	3	-	-	-	-
	Kharif-I	B.Aus (LIV)	2.5±0.25	30	3	7	1	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	10	3	-	1.0	-	-
	Rabi	Mungbean	1.2±0.12	15	18	10	3	-	-	-	-
	Kharif-I	D.Aus (MV)	3.2±0.3	54	3	10	2	-	-	-	-
	Kharif-2	T.Aman(LIV)	3.0±0.3	45	3	10	3	-	1.0	-	-
	Rabi	Chilli	1.3±0.13	65	28	22	5	-	1.0	-	-
	Kharif-I	D.Aus (MV)	3.2±0.3	54	3	7	2	-	-	-	-
	Kharif-2	T.Aman(LIV)	3.0±0.3	45	3	7	3	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-I	B.Aus (LIV)	2.5±0.25	30	6	9	1	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	10	3	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	3	7	4	-	1.0	-	-
	Irrigated										
	Rabi	Boro (MV)	6.0±0.6	120	14	23	4	-	1.0	-	-
	Kharif-I	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	3	10	3	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	66	4	7	4	-	1.0	-	-
	Rabi	Grasspea	1.2±0.1	12	6-4	1-	-	-	-	-	-
	Kharif-I	T.Aus (MV)	3.2±0.3	54	3	10	2	-	1.0	-	-
	Kharif-2	T.Aman (LIV)/	3.0+0.3	45	3	10	3	-	1.0	-	-
		T.Aman (MV)	4.0+0.4	66	4	7	4	-	1.0	-	-

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AEZ 19 : OLD MEGHNA ESTUARINE FLOODPLAIN

LAND TYPES

Highland	- 2%
Medium Highland	- 24%
Medium Lowland	- 33%
Lowland	- 21%
Very Lowland	- 3%
Homesteads +Water	- 17%

LOCATION AND EXTENTS:

Kishoregani, Habiganj, Brahmanbaria, Comilla, Chandpur
Feni, Noakhali, laksmipur, Narsingdi, Narayanganj
Dhaka, Shariatpur, Modaripur
Gopalganj and Barisal districts
7740 km² (774026 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Medium highland O.M.: Medium pH: 5.0-6.1 Texture: Silt Loam K-bearing minerals: Low	**Rainfed**										
	Rabi	Wheat	2.5±0.25	45	10	24	5	-	0.5	-	-
	Kharif-1	Jute(C)	2.8±0.2	42	4	13	5	-	-	-	-
	Kharif-2	T.Aman(LIV)/	3.0±0.3	45	3	18	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	60	4	18	6	-	1.0	-	-
	Rabi	Potato	20±2.0	67	11	48	6	-	1.0	0.5	-
	Kharif-1	Jute(C)/	2.8+0.2	42	4	13	5	-	-	-	-
		Sesame	0.8±0.1	40	10	16	8	-	1.0	0.2	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	18	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	60	4	18	6	-	1.0	-	-
	Rabi	Mustard	1.6±0.1	84	23	53	7	2.0	-	0.5	-
	Kharif-1	Jute (C)	2.8±0.2	42	4	13	5	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	18	6	-	1.0	-	-
		T.Aman (MV)	4.0+0.4	60	4	18	6	-	1.0	-	-
	Rabi	Lentil/	1.5±1.5	12	18	20	7	-	-	0.5	-
		Chickpea	1.6±01.6	10	12	14	7	-	-	0.5	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	3	18	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	60	4	18	6	-	1.0	-	-
	Rabi	Grasspea	1.2±0.1	12	6	8	4	-	-	-	-
	Kharif-1	T.Aus (MV)	4.0±0.4	50	8	20	4	-	-	0.5	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	3	18	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	60	4	18	6	-	1.0	-	-
	Rabi	Tomato/	48±4.8	60	14	25	6		0.5	0.5	
		Cauliflower	20±2.0	60	20	50	7		0.5	0.5	
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	11	3	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	T.Aus (LIV)	3.0±0.3	30	6	20	8	-	1.0	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	18	6	-	1.0	-	-
	Irrigated										
	Rabi	Boro (HYV)	5.0±0.5	105	10	40	6	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (HYV)	4.0±0.4	60	4	18	6	-	1.0	-	-
	Rabi	Boro (HYV)	5.0±0.5	105	10	40	6	-	1.0	-	-
	Kharif-1	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (HYV)	4.0±0.4	40	4	18	6	-	1.0	-	-
	Rabi	Wheat	3.5±0.35	90	16	50	4	-	1.0	0.2	-
	Kharif-1	Jute(C)	2.8±0.2	42	4	13	5	-	-	-	-
	Kharif-2	T.Aman(LIV)/	3.0±0.3	45	3	18	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	60	4	18	6	-	1.0	-	-
	Rabi	Potato	25±5.0	96	16	80	8	-	1.0	0.5	-
	Kharif-1	T.Aus (MV)	3.5±0.4	50	4	10	5	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	4	18	5	-	-	-	-
	Rabi	Mustard (LIV)	1.6±0.1	84	18	44	10	-	-	0.5	-
		Boro (MV)	5.0±0.5	105	10	40	6	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	18	5	-	1.0	-	-
Land Type: Medium Lowland O.M.: Medium pH: 5.5-6.5 Texture: Loamy K-bearing minerals: Low	**Rainfed**										
	Rabi	Wheat	2.5±0.25	45	10	24	4	-	-	-	-
	Kharif	B.Aman (L)	2.5±0.25	25	5	15	4	-	1.0	-	-
	Rabi	Wheat	2.5±0.25	45	10	24	4	-	-	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	18	5	-	1.0	-	-
	Rabi	Potato	20±2.0	67	11	56	6	-	1.0	0.5	-
	Kharif	B.Aus+B.Aman	2.8±0.3	30	6	20	5	-	-	-	-
	Rabi	Mustard	1.6±0.1	84	18	44	10	-	1.0	0.5	-
	Kharif-1	Jute(C)	2.8±0.2	42	4	13	5	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Mustard	1.6±0.1	84	18	44	10	-	1.0	0.5	-
	Kharif	B.Aus+B.Aman	2.8±0.3	30	5	20	5	-	-	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Lentil/	1.5±0.15	12	18	20	7	-	-	0.5	-
		Chickpea	1.6±0.16	10	12	14	7	-	-	0.5	-
	Kharif-1	Fallow		-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	3	18	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	60	4	18	6	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	T.Aus (LIV)	3.0±0.3	30	6	20	5	-	1.0	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	3	18	6	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	60	4	18	6	-	1.0	-	-
	Irrigated										
	Rabi	Boro (MV)	5.0±0.5	105	10	40	6	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	4	18	6	-	1.0	-	-
	Rabi	Mustard (LIV)/	1.7±0.1	84	18	44	10	-	-	0.5	-
		Boro (MV)	5.0±0.5	105	10	40	6	-	-	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	4	16	6	-	1.0	-	-
	Rabi	Boro (MV)	5.0±0.5	105	10	40	6	-	1.0	-	-
	Kharif	B.Aman (L)	2.5±0.3	25	5	15	4	-	1.0	-	-
Land Type:	**Rainfed**										
Lowland	Rabi	Wheat/	2.5±0.25	38	10	24	3	-	-	-	-
O.M.: Medium		Potato/	20±2.0	67	11	56	6	-	1.0	0.5	-
pH: 5.7-6.9		Mustard/	1.6±0.1	72	18	44	14	-	1.0	0.5	-
Texture: Silty		Grasspea/	1.2±0.1	12	6	8	4	-	-	-	-
K-bearing		Chilli	2.0±0.2	75	40	60	10	-	1.0	-	-
minerals: Low	Kharif	B.Aman	2.5±0.25	25	5	15	4	-	1.0	-	-
	Irrigated										
	Rabi	Boro (MV)	5.0±0.5	88	10	40	10	-	0.5	-	-
	Kharif	B.Aman (L)	2.5±0.3	25	5	15	4	-	1.0	-	-

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AEZ 20 : EASTERN SURMA-KUSHYARA FLOODPLAIN

LAND TYPES

Highland	- 5%
Medium Highland	- 25%
Medium Lowland	- 20%
Lowland	- 36%
Homestead + Water	- 14%

LOCATION AND EXTENTS:

Sylhet, Moulvibazar, Sunamganj and Habiganj district
4622 km^2 (462159 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Medium Highland O.M.: Medium pH: 4.7-6.9 Texture: Silt Loam K-bearing minerals: Low	**Rainfed**										
	Rabi	Mustard	1.2±0.1	64	16	34	10	-	-	0.5	-
		Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	4	23	6	-	0.5	-	-
		T.Aman (MV)	4.0±0.4	60	6	23	7	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-I	B.Aus (LIV)	2.5±0.3	30	8	20	4	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	4	23	6	-	0.5	-	-
		T.Aman (MV)	4.0±0.4	60	6	23	7	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	T.Aus (LIV)	2.5±0.3	30	8	20	4	-	0.5	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	4	23	6	-	0.5	-	-
	Rabi	Country bean	20.0±2.6	52	18	26	3	-	-	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	6	23	7	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	10	28	7	-	1.0	-	-
	Irrigated										
	Rabi	Boro (MV)	5.0±0.5	105	12	50	10	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	6	23	7	-	0.5	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Medium Lowland O.M.: Medium pH: 4.7-6.0 Texture: Clayey K-bearing minerals: Medium	**Rainfed**										
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif	B.Aus+B,Aman	2.5±0.3	30	8	25	4	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	T. Aus (MV)	3.5±0.4	51	10	28	6	-	1.0		-
	Kharif-2	T.Aman(MV)	3.5±0.4	60	6	23	7	-	0.5	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	10	28	7	-	1.0	-	-
	Rabi	Country bean	20±2.0	52	18	26	3			-	
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	6	23	7	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif	B.Aman (LIV)	2.5±0.5	25	5	20	4	-	0.5	-	-
	Irrigated										
	Rabi	Boro (MV)	5.0±0.5	105	12	50	10	-	1.0	-	-
	Kharif-1	B. Aus+B.Aman	2.5±0.3	30	4	20	4	-	0.5	-	-
	Rabi	Boro (MV)	5.0±0.5	105	12	50	10	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	4	23	6	-	0.5	-	-
	Rabi	Boro (MV)	5.0±0.5	105	12	50	8	-	1.0	-	-
	Kharif	Fallow	-	-	-	-	-	-	-	-	-
Land Type: Lowland O.M.: Medium pH: 4.7-5.5 Texture: Clayey K-bearing minerals: Medium	**Rainfed**										
	Rabi	Boro (MV)	4.0±0.4	60	10	35	6	-	1.0	-	-
	Kharif	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif	B.Aman (LIV)	2.5±0.5	25	5	20	4	-	0.5	-	-

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AEZ 21 : SYLHET BASIN

LAND TYPES

Medium Highland	- 4%
Medium Lowland	- 19%
Lowland	- 43%
Very Lowland	- 23%
Homestead + Water	- 11%

LOCATION AND EXTENTS:

This region extends over large parts of Sunamganj, Habiganj, Netrokona, Kishoreganj and Brahmanharia districts
4573 km² (457345 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Medium Lowland O.M.: High pH: 4.7-4.9 Texture: Silt Loam K-bearing minerals: Medium	**Rainfed**										
	Rabi	Mustard	1.6±0.1	50	12	30	5	-	-	-	-
	Kharif	B.Aman (LIV)	2.5±0.3	25	3	13	2	-	0.5	-	-
	Rabi	Grasspea	1.2±0.1	10	6	8	2	-	-	-	-
	Kharif	B.Aman (LIV)	2.5±0.3	25	3	13	3	-	0.5	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	T.Aus (MV)	3.5±0.4	40	8	22	3	-	1.0	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.2	37	3	18	3	-	0.5	-	-
	Irrigated										
	Rabi	Boro (MV)	5.0±0.5	80	10	40	5	-	1.0	-	-
	Kharif-1	B.Aman (LIV)	2.5±0.3	25	3	13	2	-	-	-	-
Land Type: Lowland O.M.: High pH: 4.7-4.9 Texture: Clayey K-bearing minerals: Medium	**Rainfed**										
	Rabi	Boro (LIV)	4.0±0.4	60	8	28	3	-	0.5	-	-
	Kharif	Fallow	-	-	-	-	-	-	-	-	-
Land Type: Very lowland O.M.: High pH: 4.7-4.9 Texture: Clayey K-bearing minerals: High	**Rainfed**										
	Rabi	Boro (LIV)	4.0±0.4	60	8	28	3	-	0.5	-	-
	Kharif	Fallow	-	-	-	-	-	-	-	-	-

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AEZ 22 : NORTHERN AND EASTERN PIEDMONT PLAINS

LAND TYPES

Highland	- 33%
Medium Highland	- 31%
Medium Lowland	- 16%
Lowland	- 9%
Very Lowland	- 1%
Homestead + Water	- 10%

LOCATION AND EXTENTS:

Sherpur, Netrokona, Sunamganj
Sylhet, Moulivibazar, Habiganj
Brahmanbaria and Comilla districts
4038 km^2 (403758 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type:	**Rainfed**										
Highland	Rabi	Radish	38±3.8	74	21	60	15	-	1.0	-	-
O.M.: Medium	Kharif-1	B.Aus (LIV)/	2.5±0.3	30	4	17	5	-	-	-	-
pH: 4.5-5.8		T.Aus (MV)	3.5±0.4	50	5	23	5	-	-	-	-
Texture: Sandy	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
Loam	Rabi	Fallow	-	-	-	-	-	-	-	-	-
K-bearing	Kharif-1	T.Aus (MV)	3.5±0.4	50	10	28	8	-	0.5	-	-
minerals: Low	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	17	8	-	0.5	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	T.Aus (MV)	3.5±0.4	50	10	28	8	-	0.5	-	-
	Kharif-2	Blackgram	1.0±0.1	12	5	7	-	-	-	-	-
	Irrigated										
	Rabi	Potato	25±2.5	96	20	80	10	4	1.0	1.5	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman(MV)	4.0±0.4	60	5	14	8	-	1.0	-	-
	Rabi	Mustard	1.6±0.1	84	20	54	18	20	-	0.5	-
	Kharif-1	T.Aus (MV)	3.5±0.4	50	5	23	8	-	0.5	-	-
	Kharif-2	T.Aman(MV)	4.0±0.4	60	5	23	8	-	0.5	-	-
Land Type:	**Rainfed**										
Medium High	Rabi	Mustard (LIV)	1.0±0.1	40	12	28	8	1.5	0.5	0.5	-
O.M.: Medium	Kharif-1	Kakroal	14±1.4	31	3	21	10	-	-	0.5	--
pH: 4.5-5.8	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
Texture: Sandy	Rabi	Tomato/	48±4.8	58	17	45	10	-	0.5	0.5	-
Loam		Radish	38.0±0.4	74	21	60	15	-	1.0	-	-
K-bearing	Kharif-1	T.Aus (MV)	3.5±0.4	45	5	23	8	-	0.5	-	-
minerals: Low	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Jute(C)/	2.8±0.28	42	10	32	8	-	1.0	-	-
		T.Aus (MV)	3.5±0.4	45	5	23	8	-	0.5	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.2	45	3	23	8	-	0.5	-	-
	Irrigated										
	Rabi	Boro (MV)	5.0±0.5	105	13	50	13	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	5	23	7	-	0.5	-	-
	Rabi	Wheat	3.5±0.4	90	20	63	5	2.5	-	0.5	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	5	23	8	-	1.0	-	-
	Rabi	Potato/	25.0±2.5	96	20	80	10	4	1.0	0.5	-
		Boro (MV)	5.0±0.5	105	6	25	8	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	5	23	7	-	1.0	-	-
	Rabi	Potato	25.0±2.5	96	20	80	10	4	1.0	0.5	-
	Kharif-1	T.Aus (MV)	3.5±0.4	45	5	12	5	-	0.5	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	5	23	8	-	0.5	-	-
	Rabi	Mustard (LIV)	1.2±0.1	54	15	38	10	2.0	0.5	0.5	-
		Boro (MV)	5.0±0.5	105	6	42	13	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	5	23	8	-	1.0	-	-
Land Type: Medium Lowland O.M.: Medium pH: 4.5-5.8 Texture: Silt Loam K-bearing minerals: Low	**Rainfed**										
	Rabi	Grasspea	1.2±0.1	12	6	8	6	-	0.5	-	-
	Kharif	B.Aman (LIV)	2.5±0.3	30	5	20	6	-	-	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.2	45	3	14	6	-	0.5	-	-
	Irrigated										
	Rabi	Boro (MV)	5.0±0.5	105	13	50	13	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.2	45	3	17	8	-	0.5	-	-

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AEZ 23 : CHITTAGONG COASTAL PLAINS

LAND TYPES

Highland	- 17%
Medium Highland	- 43%
Medium Lowland	- 13%
Homestead + Water	- 27%

LOCATION AND EXTENTS:

Feni, Chittagong and Cox's Bazar districts
3720 km² (372007 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Highland O.M.: Low pH: 5.6 Texture: Silt Loam K-bearing minerals: Low	**Rainfed**										
	Rabi	Radish	38.0±3.8	61	25	50	5	-	1.0	1.0	-
	Kharif-1	B.Aus (LIV)	2.5±0.3	25	4	14	2	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	38	5	18	3	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	60	6	22	5	-	1.0	-	-
	Rabi	Brinjal	42±4.2	48	20	28	3	-	-	0.5	-
	Kharif-1	Kakrol	15±1.5	27	3	20	4	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	38	5	18	3	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	60	6	18	3	-	0.5	-	-
	Rabi	Country bean	20±2.0	44	21	21	2	-	-	0.5	-
	Kharif-1	T.Aus (MV)	3.5±0.4	40	6	18	3	-	1.0	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Yardlongbean	8±0.7	10	19	15	2	-	0.5	0.5	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	6	18	3	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	T.Aus (MV)	3.5±0.4	40	12	22	3	-	1.0	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	6	18	3	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	B.Aus (LIV)	2.5±0.3	25	9	16	2	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	38	5	18	3	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	60	6	18	3	-	0.5	-	-
	Irrigated										
	Rabi	Boro (MV)	5.0±0.5	88	15	40	5	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	6	18	3	-	1.0	-	-
	Rabi	Tomato	64.0±6.0	70	30	36	4	-	0.5	0.5	-
	Kharif-1	T.Aus (MV)/	3.5±0.4	40	6	18	3	-	1.0	-	-
		Ladies Finger	12.0±1.2	52	12	25	4	-	-	-	-
	Kharif-2	T. Aman (MV)	4.0±0.4	60	6	18	3	-	0.5	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Medium Highland O.M.: Low pH: 5.6 Texture: Silt Loam K-bearing minerals: Medium	**Rainfed**										
	Rabi	Cowpea	1.0±0.1	10	9	8	2	-	-	0.5	-
	Kharif-1	T.Aus (MV)	3.5±0.4	40	6	18	3	-	-	-	-
	Kharif-2	T.Aman (MV)	1.0±0.1	60	6	18	3	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	B.Aus (LIV)	2.5±0.3	25	9	16	3	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	38	5	18	3	-	1.0	-	-
	Irrigated										
	Rabi	Boro (MV)	5.0±0.5	88	15	40	5		0.5	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	6	18	3	-	1.0	-	-
	Rabi	Potato	25±2.5	80	24	64	4	4	1.5	0.5	0.4
	Kharif-1	T.Aus (MV)	3.5±0.4	40	6	18	3	-	-	-	-
	Kharif-2	T.Aman (MV)/	4.0±0.4	60	6	18	3	-	1.0	-	-
		T.Aman (LIV)	3.0±0.3	38	5	18	3	-	1.0	-	-
	Rabi	Mustard (LIV)	1.6±0.1	70	2	44	7	-	-	0.5	-
		Boro (MV)	5.0±0.5	88	15	40	5	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	3.5±0.4	60	6	18	3	-	1.0	-	-
	Rabi	Tomato	64.0±6.4	70	30	36	4	-	0.5	0.5	-
	Kharif-1	T.Aus (MV)	3.5±0.4	40	6	18	3	-	1.0	-	-
	Kharif-2	T.Aman (MV)	3.5±0.4	45	8	25	5	-	1.0	-	-
	Rabi	Panikachu	30±3	80	27	54	6	-	-	-	-
	Kharif-1	-	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman(LIV)	3.0±0.3	38	5	18	3	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	T.Aus (MV)	3.5±0.4	40	12	22	3	-	1.0	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	6	18	3	-	0.5	-	-

Uploaded by: Mirza Hasanuzzaman, Department of Agronomy, SAU

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Medium Lowland O.M.: Medium pH: 4.6-6.0 Texture: Silt Loam K-bearing minerals: Medium	**Rainfed**										
	Rabi	Mustard (LIV)/ Groundnut	1.28±0.1 1.6±0.2	50 20	19 21	30 21	5 5	- -	- 0.5	0.5 0.3	- 0.3
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	38	5	18	3	-	1.0	-	-
	Rabi	Cowpea	1.0±0.1	10	9	8	2	-	-	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.aman (LIV)	3.0±0.3	38	5	18	3	-	0.5	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	T.Aus (MV)	3.5±0.4	40	12	22	3	-	1.0	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	6	18	3	-	0.5	-	-
	Irrigated										
	Rabi	Boro (MV)	5.0±0.5	88	15	40	5		1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	6	18	3	-	0.5	-	-
	Rabi	Maize	5.0±0.5	88	36	50	8	0.3	-	0.5	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	60	5	18	3	-	1.0	-	-

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AEZ 24 : ST. MARTIN'S CORAL ISLAND

LAND TYPES

Highland	- 33%
Medium Highland	- 63%
Medium Lowland	- 2%
Homestead + Water	- 2%

LOCATION AND EXTENTS:

St. Martin's Island
8 km^2 (804 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Highland O.M: Low pH: 7.0-7.5 Texture: Sandy K-bearing minerals: Low	**Rainfed**										
	Rabi	Onion/	16.0±1.6	90	45	80	5	-	1.0	-	-
		Garlic	10.0±1.0	90	45	80	5	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
Land Type: Medium Highland (Depressions) O.M: Low pH: 7.0-7.5 Texture: Sandy Loam K-bearing minerals: Low	**Rainfed**										
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	10	22	3	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	65	12	25	3	-	1.0	-	-
	Irrigated										
	Rabi	Cucurbits	16.0±2	80	35	50	10	-	-	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	12	25	3	-	1.0	-	-
Land Type: Medium Lowland O.M: medium pH: 4.5-5.8 Texture: Silt Loam K-bearing minerals: Low	**Rainfed**										
	Rabi	Grasspea	1.2±0.1	12	9	12	5	-	-	0.5	-
	Kharif	B.Aman (LIV)	2.5±0.3	30	5	20	3	-	-	-	-

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AEZ 25 : LEVEL BARIND TRACT

LAND TYPES

Highland	- 30%
Medium Highland	- 55%
Medium Lowland	- 4%
Lowland	- 2%
Homestead + Water	- 9%

LOCATION AND EXTENTS:

Dinajpur, Gaibandha, Jaipurhat Bogra, Noagaon, Sirajganj and Natore district
5049 km^2 (504851 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Highland O.M.: Low pH: 5.0-5.7 Texture: Loamy K-bearing minerals: Low	**Rainfed**										
	Rabi	Sugarcane	65.0±6.5	112	35	104	24	16	2.5	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-I	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	10	28	5	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	65	12	35	6	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	B.Aus (LIV)	2.5±0.3	25	4	20	4	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	10	28	5	-	1.0	-	-
	Irrigated										
	Rabi	Sugarcane	80.0±8.0	120	36	100	20	15	2.0	-	-
	Rabi	Sugarcane+	80.0±8.0	120	36	100	20	15	2.0	-	-
		Potato	10.0±1.0	40	10	30	-	-	-	-	-
	Rabi	Boro (MV)	5.0±0.5	95	15	45	6	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	5	28	6	-	1.0	-	-
	Rabi	Wheat	3.5±0.4	90	25	60	8	-	-	1.0	-
	Kharif-1	T.Aus (MV)/	3.5±0.4	50	8	25	5	-	1.0	-	-
		Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman(MV)	4.0±0.4	65	5	28	6	-	1.0	-	-
	Rabi	Potato	25.0±2.5	95	25	90	8	5	2.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	5	20	6	-	1.0	-	-
	Rabi	Potato	25±2.5	95	25	80	8	5	2.0	-	
		Boro (MV)	4.8±0.5	95	15	45	6	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	5	20	6	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Potato	25.0±2.5	95	25	90	8	5	2.0	-	-
	Kharif-1	T.Aus (MV)	3.5±0.4	50	4	12	5	-	-	-	-
	Kharif-2	T.Aman (MV)	3.5±0.4	65	5	20	6	-	1.0	-	-
	Rabi	Mustard	1.6±0.1	85	18	55	15	-	-	1.0	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	5	28	6	-	1.0	-	-
	Rabi	Mustard	1.2±0.1	55	20	30	10	-	-	1.0	-
		Boro (MV)	4.8±0.5	95	15	45	6	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	8	28	6	-	1.0	-	-
	Rabi	Cabbage/	70.0±7.0	126	60	45	10	-	1.0	1.0	-
		Tomato	64.0±6.4	85	30	45	8	-	0.5	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	7	20	6	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	T.Aus (MV)	3.5±0.4	50	8	25	5	-	1.0	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	12	35	6	-	1.0	-	-
Land Type: Medium Highland O.M.: Low pH: 5.0-5.7 Texture: Loamy K-bearing minerals: Low	**Rainfed**										
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	B.Aus (LIV)	2.5±0.3	25	4	20	5	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	10	28	15	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Jute (0)	3.0±0.3	65	13	50	9	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	10	28	7	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Kaon	2.0±02	60	20	35	10	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	12	35	6	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman(LIV)	3.0±0.3	45	6	28	6	-	0.5	-	-
		T.Aman (MV)	4.0±0.4	65	12	35	6	-	1.0	-	-
	Irrigated										
	Rabi	Boro (MV)	4.8±0.5	95	15	45	6	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	7	28	6	-	1.0	-	-
	Rabi	Boro (MV)	4.8±0.5	95	15	45	6	-	1.0	-	-
	Kharif-1	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	7	28	6	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Maize	8.0±0.8	196	36	94	24	-	2.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	7	28	6	-	1.0	-	-
	Rabi	Potato/	25.0±2.5	95	25	80	8	5	2.0	-	-
		Boro (MV)	4.8±0.5	95	15	45	6	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	7	28	6	-	-	-	-
	Rabi	Potato	25±2.5	95	25	80	8	5	2.0	-	
	Kharif-1	T.Aus (MV)	3.5±0.4	50	4	12	5	-	-	-	-
	Kharif-2	T.Aman (MV)	4.8±0.4	65	7	28	6	-	1.0	-	-
	Rabi	Mustard	1.2±0.1	55	20	30	10	5	-	1.0	-
		Boro (MV)	4.5±0.5	95	15	45	6	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	22	5	-	1.0	-	-
	Rabi	Onion	16.0±1.6	90	30	100	20	-	1.0	1.0	-
	Kharif-1	T.Aus (MV)	3.5±0.4	50	4	12	5	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	8	28	6	-	1.0	-	-
	Rabi	Tomato	64.0±6.4	85	30	45	8	-	0.5	-	-
	Kharif-1	T.Aus (MV)	3.5±0.4	50	4	12	5	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	8	28	6	-	1.0	-	-

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AEZ 26 : HIGH BARIND TRACT

LAND TYPES

Highland	- 93%
Medium Highland	- 1%
Homestead + Water	- 11%

LOCATION AND EXTENTS:

Rajshahi, Nowabganj and Noagaon districts

1600 km² (159964 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Highland O.M.: Low pH: 4.8-5.9 Texture: Loamy K-bearing minerals: Low	**Rainfed**										
	Rabi	Sugarcane	65.0±6.5	95	30	60	20	12	1.5	-	-
	Rabi	Wheat	2.5±0.2	45	15	18	6	-	-	1.0	-
	Kharif-1	T.Aus (MV)	3.5±0.4	50	6	12	4	-	1.0	-	-
	Kharif-2	Blackgram	1.0±0.1	12	12	13	-	-	-	-	-
	Rabi	Wheat	2.5±0.2	45	15	18	6	-	-	1.0	-
	Kharif-1	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	6	22	8	-	1.0	-	-
	Rabi	Wheat	2.5±0.2	45	15	30	5	-	-	1.0	-
	Kharif-1	Ladies Finger	10.0±1.0	44	16	26	7	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	7	28	8	-	1.0	-	-
	Rabi	Potato	20±2.0	75	20	65	8	4	1.0	-	-
	Kharif-1	T.Aus (MV)	3.5±0.4	50	6	12	5	-	1.0	-	-
	Kharif-2	Blackgram	1.0±0.1	12	12	13	-	-	-	-	-
	Rabi	Mustard/	1.0±0.1	55	16	35	10	-	-	1.0	-
		Chickpea+	1.5±0.2	20	25	25	10	-	-	1.0	0.5
		Lentil	-	-	-	-	-	-	-	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	6	22	8	-	1.0	-	-
	Rabi	Chickpea+	2.0±0.2	20	25	25	10	-	-	0.5	0.5
		Barley/	-	-	-	-	-	-	-	-	-
		Chickpea+	2.0±0.2	20	25	25	20	-	-	0.5	0.5
		Mustard	-	-	-	-	-	-	-	-	-
		Chickpea+	2.0±0.2	20	20	40	14	-	-	0.5	0.5
		Lentil	-	-	-	-	-	-	-	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	7	28	8	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Chickpea	1.6±0.2	12	19	17	10	-	-	1.0	0.5
	Kharif-1	Fallow	-	-	-	-	-	-	1.0	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	6	22	8	-	-	-	-
		T.Aman (MV)	3.5±0.4	60	6	14	8	-	1.0	-	-
	Rabi	Chickpea	1.6±0.2	12	19	17	10	-	-	1.0	0.5
	Kharif-1	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	7	28	8	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-I	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	8	22	8	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	65	7	28	8	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	B.Aus (LIV)	2.5±0.3	30	8	20	5	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	6	22	8	-	1.0	-	-
	Rabi	Fallow	2.4±0.2	36	10	28	7	-	-	-	-
	Kharif-1	Jute(C)/	2.8±0.3	42	12	45	10	-	-	-	-
		B.Aus (LIV)/	2.5±0.3	30	8	20	5	-	-	-	-
		Kaon	2.0±0.2	60	20	35	5	-	-	-	-
	Kharif-2	T.Aman(LIV)	3.0±0.3	45	6	22	8	-	1.0	-	-
	Irrigated										
	Rabi	Sugarcane	80.0±8.0	120	36	75	25	15	2	-	-
	Rabi	Sugarcane +	80.0±8.0	120	36	75	25	15	2	-	-
		Cabbage/	20.0±2.0	50	20	25	-	-	-	1.0	-
		Cauliflower/	8.0±0.8	50	20	50	9	-	-	1.0	-
		Spinach	8.0±0.8	28	5	32	7	-	-	-	-
	Rabi	Boro (MV)	4.8±0.5	95	15	45	8	-	1.0	-	-
	Kharif-1	Fallow/	-	-	-	-	-	-	-	-	-
		T.Aus (MV)	3.5±0.4	50	6	12	4	-	1.0	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	6	28	8	-	1.0	-	-
		T.Aman (MV)	40±0.4	65	7	28	8	-	1.0	-	-
	Rabi	Boro (MV)	4.8±0.5	95	15	45	8	-	1.0	-	-
	Kharif-1	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	65	6	22	8	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	65	7	28	8	-	1.0	-	-
	Rabi	Wheat	3.5±0.4	75	24	62	10	-	-	1.0	-
	Kharif-1	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.8±0.3	45	6	22	8	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	65	7	28	8	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Wheat	3.5±0.4	90	25	60	10	-	-	1.0	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)/	4.0±0.4	65	7	28	8	-	1.0	-	-
		T.Aman (LIV)	2.0±0.3	45	6	22	8	-	1.0	-	-
	Rabi	Potato	25±2.5	95	25	80	10	5	2.0	-	-
	Kharif-1	Maize/	5.0±0.5	108	35	60	15	-	1.0	-	-
		T.Aus (MV)	3.5±0.4	50	6	12	4	-	1.0	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	7	28	8	-	1.0	-	-
	Rabi	Mustard	1.6±0.2	85	28	55	17	-	-	1.0	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	7	28	8	-	1.0	-	-
	Rabi	Tomato	6.4±6.4	85	30	45	10	-	-	1.0	-
	Kharif-1	T.Aus(MV)	3.5±0.4	50	6	12	5	-	1.0	-	-
	Kharif-2	T.Aman(MV)	4.0±0.4	65	7	28	8	-	1.0	-	-

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AEZ 27 : NORTH EASTERN BARINDTRACT

LAND TYPES

Highland	- 36%
Medium Highland	- 56%
Medium Lowland	- 1%
Homestead + Water	- 7%

LOCATION AND EXTENTS:

Dinajpur, Rangpur, Gaibandha Jaipurhat and Bogra districts
1079 km^2 (107926 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Highland O.M.: Low pH: 4.8-5.6 Texture: Loamy K-bearing minerals: Low	**Rainfed**										
	Rabi	Sugarcane	65.0±6.5	95	20	80	20	12	1.5	-	-
	Rabi	Potato	20±2.0	75	12	52	8	4	1.5	-	-
	Kharif-1	Jute (O)/	3.0±0.3	55	8	25	5	-	-	-	-
		T.aus (MV)	2.8±0.3	36	4	12	3	-	0.6	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	15	8	-	1.0	-	-
	Rabi	Mustard/	1.6±0.1	55	15	30	10	-	1.0	1.0	-
		Blackgram	1.0±0.1	12	8	10	-	-	-	1.0	-
	Kharif-1	B.Aus (L)	2.5±0.3	25	5	15	6	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Sesame	1.0±0.1	54	14	22	12	-	-	0.3	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	15	8	-	1.0	-	-
	Rabi	Brinjal	40±4.0	55	14	28	7	-	1.0	-	-
	Kharif-1	Jute(Mesta)	2.0±0.2	60	7	20	-	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Cabbage	56±5.6	88	42	25	14	-	2.0	1.0	-
	Kharif-1	B.Aus(LIV)	2.5±0.3	30	2	8	3	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Irrigated										
	Rabi	Sugarcane	80.0±.0.8	120	25	100	25	15	2.0	-	-
	Rabi	Sugarcane+	80.0±.0.8	120	25	100	25	15	2.0	-	-
		Potato/	10.0±1.0	40	6	25	-	-	-	-	-
		Mungbeen	0.7±0.1	7	7	5	-	-	-	-	-
	Rabi	Boro (MV)	4.8±0.5	95	10	35	8	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	66	6	20	8	-	0.6	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Rabi	Maize	8.0±0.8	145	35	75	3	-	2.0	-	-
	Kharif-1	Jute (O)	3.5±0.4	65	9	30	5	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	5	20	8	-	1.0	-	-
	Rabi	Potato	25.0±2.5	95	15	65	10	5	2.0	-	-
	Kharif-1	Boro (MV)	5.0±0.5	95	10	35	8	-	1.0	-	-
	Kharif-2	T.Aman(MV)	4.0±0.4	60	4	15	8	-	1.0	-	-
	Rabi	Potato	25.0±2.5	96	16	80	10	5	2.0	-	-
	Kharif-1	T.Aus (MV)	3.2±0.3	54	4	16	5	-	0.5	-	-
	Kharif-2	T.Aman(MV)	4.0±0.4	65	5	15	8	-	1.0	-	-
Land Type: Medium Highland O.M.: Low pH: 4.8-5.6 Texture: Loamy K-bearing minerals: Low	**Rainfed**										
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	B.Aus(LIV)/	2.5±0.3	30	4	15	5	-	-	-	-
		Jute (O)/	3.0±0.3	55	8	25	5	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	5	15	8	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	65	5	20	8	-	1.0	-	-
	Irrigated										
	Rabi	Boro (MV)	4.8±0.5	95	10	35	8	-	1.0	-	-
	Kharif-1	Fallow/	-	-	-	-	-	-	-	-	-
		T.Aus (MV)	3.2±0.3	54	4	16	5	-	0.5	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	5	20	8	-	1.0	-	-
	Rabi	Boro (MV)	4.8±0.5	95	10	35	8	-	1.0	-	-
	Kharif-1	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman(MV)	4.0±0.4	65	5	20	8	-	1.0	-	-
	Rabi	Wheat	3.5±0.4	90	15	50	10	-	-	1.0	-
	Kharif-1	T.Aus (MV)/	3.2±0.3	54	4	16	5	-	0.5	-	-
		Jute (O)	3.5±0.4	65	9	30	5	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	5	20	8	-	1.0	-	-
	Rabi	Potato	25.0±2.5	95	15	65	10	5	2.0	-	-
	Kharif-1	Fallow/	-	-	-	-	-	-	-	-	-
		T.Aus (MV)	3.2±0.3	54	4	16	5	-	0.5	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	5	20	8	-	1.0	-	-
	Rabi	Mustard	1.2±0.1	55	22	30	10	-	-	1.0	-
		Boro (MV)	4.8±0.5	95	10	35	8	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	5	20	8	-	1.0	-	-

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AEZ 28 : MADHUPUR TRACT

LAND TYPES

Highland	- 56%
Medium Highland	- 18%
Medium Lowland	- 7%
Lowland	- 9%
Homestead + Water	- 10%

LOCATION AND EXTENTS:

Dhaka, Gazipur, Narsingdi
Narayanganj, Tangail, Mymensingh
and Kishoreganj districts
4244 km^2 (424359 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Highland O.M.: Low pH: 4.8-5.5 Texture: Loamy K-bearing minerals: Low	**Rainfed**										
	Rabi	Sugarcane	65.0±6.5	95	25	100	20	12	1.5	-	-
	Rabi	Mustard	1.0±0.1	55	15	35	10	-	1.0	1.0	-
	Kharif-1	B.Aus (LIV)	2.5±0.3	30	4	10	4	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Lentil/	1.5±0.15	12	22	25	10	-	1.0	1.0	0.5
		Chickpea	2.0±0.2	12	22	25	10	-	1.0	1.0	0.5
	Kharif-1	Jute (0)	2.4±0.2	35	9	28	7	-	-	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	B.Aus (LIV)/	2.5±0.3	30	8	20	5	-	-	-	-
		T.Aus (MV)	3.5±0.4	50	10	25	6	-	1.0	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	3	14	7	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	65	10	28	8	-	1.0	-	-
	Irrigated										
	Rabi	Sugarcane	80.0±0.8	120	30	125	25	15	2.0	-	-
	Rabi	Sugarcane+	80.0±0.8	120	30	125	25	15	2.0	-	-
		Lentil/	0.6±0.1	10	12	8	-	-	-	-	-
		Mungbeen	0.7±0.1	7	7	5	-	-	-	-	-
	Rabi	Boro (MV)	4.8±0.5	95	12	45	8	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	7	28	8	-	1.0	-	-
	Rabi	Boro (MV)	4.8±0.5	95	12	45	8	-	1.0	-	-
	Kharif-1	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman(MV)	4.0±0.4	65	7	28	8	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Medium highland O.M.: Low pH: 4.8-5.5 Texture: Loamy K-bearing minerals: Low	**Rainfed**										
	Rabi	Wheat	2.5±0.3	45	12	30	3	-	-	1.0	-
	Kharif-1	B.Aus (LIV)/	2.5±0.3	30	6	20	3	-	-	-	-
		Jute(C)	2.4±0.2	35	9	28	7	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	3	14	7	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	65	7	28	8	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Jute(C)	2.4±0.2	35	9	28	7	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	3	14	7	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	65	7	28	8	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	B.Aus (LIV)	2.5±0.3	30	8	20	5	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	3	14	7	-	1.0	-	-
	Irrigated										
	Rabi	Boro (MV)	4.8±0.5	95	12	45	8	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
		T.Aus (MV)	3.2±0.3	54	6	24	6	-	-	-	-
	Kharif-2	T.Aman (LIV)/	2.8±0.3	45	3	14	7	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	65	7	28	8	-	1.0	-	-
	Rabi	Wheat	3.5±0.4	90	20	60	10	-	-	1.0	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	3	14	7	-	1.0	-	-
		T.Aman (MYV)	4.0±0.4	65	7	28	8	-	1.0	-	-
	Rabi	Wheat	3.5±0.4	90	20	60	10	-	-	1.0	-
	Kharif-1	GM	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	3	14	7	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	65	7	28	8	-	1.0	-	-
	Rabi	Mustard	1.6±0.16	85	20	55	15	-	-	1.0	-
		Boro (MV)	4.8±0.5	95	12	45	8	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	7	28	8	-	1.0	-	-

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AEZ 29 : NORTHERN AND EASTERN HILLS

LAND TYPES

Highland	- 92%
Medium Highland	- 2%
Medium Lowland	- 1%
Homestead + Water	- 5%

LOCATION AND EXTENTS:

Mainly in Khagrachhari, Chittagong Hill Tracts, Bandarban, Chittagong, Cox's Bazar, Habiganj and Molvibazar districts. Small areas occur along the northern border of Sherpur, Mymensingh, Sunamganj and Sylhet district, in central and south-eastern Sylhet and in the east of Brahmanbaria, Comilla and Feni district
18172 km^2 (1817172 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Highland O.M.: Low pH: 4.5-4.9 Texture: Loamy K-bearing minerals: Low	**Rainfed**										
	Rabi	Sugarcane	65.0±6.5	95	25	80	15	12	1.5	-	-
	Rabi	Sweet potato	24.0±2.4	60	25	40	6	2.0	1.0	-	-
	Kharif-I	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	15	6	-	1.0	-	-
	Rabi	Cowpea	1.5±0.1	15	12	12	-	-	-	0.5	-
	Kharif-I	B.Aus (LIV)	2.5±0.3	30	3	8	4	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	15	6	-	1.0	-	-
	Rabi	Brinjal	42.0±4.2	60	20	36	6	-	-	-	-
	Kharif-I	Cucumber	16.0±1.6	45	10	16	6	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	6	15	6	-	1.0	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	6	15	6	-	1.0	-	-
	Irrigated										
	Rabi	Boro (MV)	4.8±0.5	95	12	35	6	-	1.0	-	-
	Kharif-1	Fallow		-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	6	20	6	-	1.0	-	-
	Rabi	Snake Gourd/	18.0±2	45	10	40	15	10	-	-	-
		Bitter Gourd/ Sweet Gourd/ / Ridge Gourd/ Cucumber	23.0±2	50	30	60	15	10	-	-	-
		Coriander leaf	1.8±0.2	80	30	60	15	10	-	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	2.8±0.3	45	5	15	6	-	1.0	-	-
	Rabi	Country been	40.0±4	150	50	120	30	10	-	0.5	0.5
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (LIV)	3.0±0.3	45	5	15	6	-	1.0	-	-

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AEZ 30 : AKHAURA TERRACE

LAND TYPES

Highland	- 55%
Medium Highland	- 11%
Medium Lowland	- 10%
Lowland	- 15%
Very Lowland	- 3%
Homestead + Water	- 6%

LOCATION AND EXTENTS:

Brahmanbaria district and minor area in Habiganj district
113 km^2 (11324 ha)

Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
Land Type: Highland O.M.: Low pH: 5.5-6.5 Texture: Loamy K-bearing minerals: Low	**Rainfed**										
	Rabi	Sugarcane+	65.0±6.5	95	25	100	20	15	1.5	-	-
	Kharif-1	Turmeric	1.5±0.2	50	15	40	10	-	-	-	-
Land Type: Medium Highland O.M.: Low pH: 5.5-6.5 Texture: Loamy K-bearing minerals: Low	**Rainfed**										
	Rabi	Wheat	2.3±0.2	45	12	20	5	-	-	1.5	-
	Kharif-1	T.Aus (LIV)	2.8±0.3	40	6	25	6	-	1.0	-	-
	Kharif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Potato	2.0±0.2	75	15	65	8	4	1.5	-	
	Kharif-1	T.Aus (MV)	3.5±0.4	50	5	12	6	-	1.0	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	6	28	8	-	1.0	-	-
	Rabi	Mustard	1.2±0.1	60	15	35	15	-	1.0	1.0	-
	Kharif-1	Jute (C)	2.4±0.2	35	9	28	7	-	-	-	-
	Khrif-2	Fallow	-	-	-	-	-	-	-	-	-
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-1	T.Aus (MV)	3.5±0.5	50	10	25	6	-	1.0	-	-
	Kharif-2	T.Aman (LIV)/	3.0±0.3	45	3	14	7	-	1.0	-	-
		T.Aman (MV)	4.0±0.4	65	6	28	8	-	1.0	-	-

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Land and Soil Characteristics	Cropping Pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							
	Seasons	Crops		N	P	K	S	Mg	Zn	B	Mo
	Irrigated										
	Rabi	Boro (MV)	4.8±0.5	95	12	45	8	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	6	28	8	-	1.0	-	-
	Rabi	Mustard (LIV)	1.6±0.16	85	22	55	15	-	-	1.0	-
		Boro (MV)	4.8±0.5	95	12	45	15	-	1.0	-	-
	Kharif-1	Fallow	-	-	-	-	-	-	-	-	-
	Kharif-2	T.Aman (MV)	4.0±0.4	65	6	28	8	-	1.0	-	-
Land Type: Medium Lowland O.M.: Medium pH: 5.5-6.5 Texture: Loamy K-bearing minerals: Low	**Rainfed**										
	Rabi	Fallow	-	-	-	-	-	-	-	-	-
	Kharif	B.Aman (LIV)	2.5±0.3	25	5	15	4	-	-	-	-
	Irrigated										
	Rabi	Boro (MV)	4.8±0.5	95	12	45	15	-	1.0	-	-
	Kharif-1	B.Aman (LIV)	2.5±0.3	25	5	15	4	-	-	-	-

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10.4 Fertilizer Recommendation for Multiple Cropping System

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
	Seasons	Crops		N	P	K	S	Mg	Zn	B	
Medium highland AEZ: 3, 9, 11, 19	Rabi	Composite Maize (100%) + Groundnut (33%)	5.0-5.5 + 0.9-1.0	120	30	50	20	0	1.5	1.5	2-3
	Kharif	Composite Maize (100%) + Groundnut (33%)	3.0-3.5 + 0.6-0.7	84	20	35	14	0	1.0	1.0	0

Sowing time : Kharif: Mid March – Mid April, Rabi: Mid November- Mid December

Sowing method : Four rows of groundnut (30 cm x 10 cm) in between maize paired rows (37.5 cm/ 150 cm/ 37.5 cm) or 2 rows of groundnut in maize normal row (75 cm x 25 cm)

Fertilizer : Kharif: 2/3rd N top dressed at 21 & 42 DAS +1/3rd N & other fertilizer as basal
Rabi : 2/3rd N top dressed at 30 & 60 DAS +1/3rd N & other fertilizer as basal

Note : The dose of N, P & K may be reduced based on quantity of CD to be applied and as per Appendix-6

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
	Seasons	Crops		N	P	K	S	Mg	Zn	B	
High and medium highland AEZ: 11, 12, 13	Kharif	Composite Maize (100%) + Mungbean/ Blackgram (33%)	3.0-4.0 + 0.5-0.6/ 0.5-0.6	84	20	35	14	0	1.0	1.0	0

Sowing time : Mid March to Last week of March

Sowing method : Fours of Mungbean (25 cm x 5cm) in between maize paired rows (37.5 cm x 150 cm/ 37.5 cm) or 2 rows of mungbean in maize normal row (75 cm x 25 cm)

Fertilizer : 2/3rd N top dressed at 21 & 42 DAS in maize rows only. +1/3rd N & other fertilizer as basal

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Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
	Seasons	Crops		N	P	K	S	Mg	Zn	B	
High and medium highland AEZ: 11, 12, 26	Rabi	Composite Maize (100%) + Chickpea (33%)	5.0-5.5 + 0.8-1.0	120	30	50	20	0	1.5	1.5	2-3

Sowing time : 2nd week of November to last week of November

Sowing method : Fours rows of chickpea (30 cm x 5 cm) in between maize paired rows (37.5 cm x 15 cm x 37.1 cm) or 2 rows of chickpea in maize normal rows (75 cm x 25 cm)

Fertilizer : 2/3rd N top dressed at 35 & 65 DAS in maize rows only +1/3rd N & other fertilizers as basal

Note : The dose of N, P & K may be reduced based on quantity of CD to be applied and as per Appendix-6.

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
	Seasons	Crops		N	P	K	S	Mg	Zn	B	
Medium highland AEZ: 3, 11, 23	Rabi	Composite Maize (100%) + Radish (40%)	6.0-6.5 + 20.0-25.0	160	32	64	20	0	1.5	1.5	2.3

Sowing time : November 1st week to last week

Sowing method : One row of radish (15cm, plant to plant) in between maize row (75 cm x 25 cm)

Fertilizer : 2/3rd N top dressed at 35 DAS & rest after harvest of radish+1/3rd N & other fertilizers as basal

Note : The dose of N, P & K may be reduced based on quantity of CD to be applied and as per Appendix-6

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
Medium highland AEZ: 13, 23	Rabi	Composite Maize (100%) + Cowpea (50%)	3.0-4.0 + 1.0-1.5	90	25	30	8	0	1.0	0	0

Sowing time : Mid November to Mid December

Sowing method : Two rows of cowpea (30 cm x 100 cm) in between normal maize row (90cm x 25cm)

Fertilizer : 2/3rd N top dressed at 30 and 65 DAS only +1/3rd N & other fertilizer as basal

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Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
Medium high and medium land AEZ: 3, 11, 16,23, 25	Rabi	Composite Maize (100%) + Khesari/ Cowpea (33%) with no tillage after recedes of flood water	4.0-4.5 + 0.5-0.6 0.7-0.8	100	20	25	20	0	1	1	2-3

Sowing time : Mid October to 1st week of December

Sowing method : Three rows of field pea (3o cm apart) or broadcast khesari in between maize rows

Fertilizer : 2/3rd N top dressed at 30 & 60 DAS in maize rows only+1/3rd N & other fertilizer as basal

Note : The dose of N, P & K may be reduced based on quantity of CD to be applied and as per Appendix-6

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
High and medium highland AEZ: 4, 23, 25	Rabi	Chili (100%) + Composite maize (20%)	1.5-1.8 + 1.0-1.25	80	25	60	10	0	1.0	0	4-12

Sowing time : November 1st week to last week of November

Sowing method : One row of maize (180 cm) in between chili rows (50cm x 30cm) or one row of maize (90 cm) in between chili rows

Fertilizer : 2/3rd N top dressed at 30 & rest at 60 DAS in maize rows only+1/3rd N & other fertilizer as basal

Note : The dose of N, P & K may be reduced based on quantity of CD to be applied and as per Appendix-6

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
Medium highland AEZ: 8	Rabi	Tomato (100%) + Composite Maize (20%)	60.0-70.0 + 1.0-1.5	240-250	74-78	120-130	15	0	1	0	8-12

Sowing time : Mid November to Mid December

Sowing method : One row of maize (140cm) in between tomato rows (60cm x 30cm)

Fertilizer : Top dressed N in tomato rows at 25 & 50 DAS, other fertilizers as basal

Note : The dose of N, P & K may be reduced based on quantity of CD to be applied and as per Appendix-6

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Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
Medium highland & Medium land AEZ: 4, 9, 16	Rabi	Potato (100%) + Composite maize (25%)	25.0-30.0 + 1.25-1.50	160-165	40-44	82-87	18-21	0	2	0	3-4

Sowing time : 1st week of November to last week of December

Sowing method : Potato 60cm x 30cm, maize ((100cm apart) in same potato rows

Fertilizer : Top dressed 2/3rd N at 25 & rest 45 DAS in potato rows, +1/3rd N & other fertilizers as basal

Note : The dose of N, P & K may be reduced based on quantity of CD to be applied and as per Appendix-6

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
High & Medium high AEZ: 9, 12, 24	Rabi	Sweet potato (100%) + Composite Maize (10 to 20%)	16.0 + 1.5-2.0	60	25	30	18	0	0	0	0

Sowing time : November to Mid December

Sowing method : Sweet potato (60cm x 30cm), one row of maize (60cm apart) in sweet potato rows

Fertilizer : 2/3rd N top dressed at 25 & rest at 40 DAS in maize rows, +1/3rd N & other fertilizers as basal

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
High & Medium highland AEZ: 11	Kharif (Rainfed)	Mukhikachu (100%) + Composite maize (as fodder 50%)	5.0 + 6.0 (Green fodder)	70	25	85	0	0	0	0	0

Sowing time : Mid March – Mid April

Sowing method : Mukhikuchu (60cm x 25cm), one row of maize (25cm apart) alternate two rows of mukhikuchu

Fertilizer : 1/4th N & K at 45 DAS and rest 1/4th N & K at 75 DAS in mukhikuchu rows only, +1/2 N & other fertilizers as basal

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Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
High and medium highland AEZ: 3a, 3b, 3c, 11, 1	Rabi	Hybrid Maize (100%)+ Soybean (33%)	7.5-8.0 + 1.0-1.2	200-250	35-50	65-100	20-40	2	3	1	0

Sowing time : December 1st week to 2nd week of December

Sowing method : Fours of Soybean (30 cm x 10cm) in between maize paired rows (37.5 cm x 150 cm/ 37.5 cm) or 2 rows of Soybean in between maize normal row (75 cm x 25 cm)

Fertilizer : 1/3rd N top dressed at 35 & rest 1/3 at 65 DAS in maize rows only+1/3rd N & other fertilizer as basal

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
High & medium highland AEZ: 3, 4, 11, 13	Rabi	Hybrid maize (100%) + French bean (50%)	7.0 + 9.0	200	40	60	30	0	2	1	0

Sowing time : Mid November to 1st week of December

Sowing method : 4 rows of French bean (40%) 25cm apart in between maize paired row (37.5cm/ 150cm/37.5cm)

Fertilizer : 2/3rd N as top dressed at 30 and 35 DAS in maize rows only+1/3rd N & other fertilizer as basal

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
High and medium highland AEZ: 3, 11. 23	Rabi	Hybrid maize (100%) + Carrot (33%)	7.0 + 5.0	200	35	66	30	0	2	1	3-5

Sowing time : Mid November to 1st week of December

Sowing method : 4 rows of carrot 25 cm apart in between maize paired rows (37.5cm/ 150cm/37.5cm)

Fertilizer : 2/3rd N as top dressed at 30 and 65 DAS. +1/3rd N & other fertilizer as basal

Note : The dose of N, P & K may be reduced based on quantity of CD to be applied and as per Appendix-6

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Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
High and medium highland AEZ: 4, 11, 12	Rabi	Onion (100%) + Maize (10%)	12.0 + 1.5	120	40	80	30	0	2.0	0	0

Sowing time : Mid December

Sowing method : One row of maize (140cm) in between onion rows (30cm apart)

Fertilizer : All basal except 50% N top dressed 3 & 5 weeks after transplantation

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
Medium highland AEZ: 3, 8, 11,	Rabi	Maize (100%) + Spinach + Lalshak + Gimakalmi	4.0-5.0 + 4.0-5.0 + 3.0-4.0 + 10-11	100	20	20	20	0	2	0	3-5

Sowing time : Mid November to Last week of November

Sowing method : Maize 75cm x 25cm, two rows of lalshak/spinach/gimakalmi at a spacing of 25 cm

Fertilizer : 1/3rd N and all fertilizers as basal. Rest urea at 30 and 60 DAS as band placement in maize rows

Note : The dose of N, P & K may be reduced based on quantity of CD to be applied and as per Appendix-6

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
Medium highland AEZ: 3a, 3b, 3c, 11, 13	Rabi (rainfed)	Tobacco (100%) + Chickpea (10%)/ Lentil (50%)	1.60 + 0.70/ 0.60	50	20	35	0	0	0	0	0

Sowing time : Mid October to– Mid November

Sowing method : Three rows of chickpea (40cm apart) in between paired rows of tobacco (37.5cm/4 cm/37.5cm), plant to plant tobacco 60cm. But in case of Lentil, broadcast (50% seed rate)

Fertilizer : 1/2 N & other fertilizers as basal and 1/2 N at 30 DAS of tobacco plants

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Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
Medium highland AEZ: 13, 11	Rabi (Rainfed)	Chickpea (100%) + Coriander (33%)	1.0 + 0.30	20	17	15	0	0	0	0	0

Sowing time : Mid October to November

Sowing method : Broadcast (30 kg seed/ha of chickpea and 3 kg seed/ha of coriander)

Fertilizer : As basal

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
Medium highland AEZ: 11, 26	Rabi (Rainfed)	Chickpea (67%) + Linseed (33%)	1.0 + 0.30	20	17	15	0	0	0	0	0

Sowing time : Mid October to Mid November

Sowing method : One row of linseed in between two rows of chickpea (30cm x 10cm)

Fertilizer : All fertilizer as basal

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
Medium highland AEZ: 11, 26	Rabi (Rainfed)	Chickpea (50%) + Mustard (50%)	1-10 + 0-90	20	6	10	0	0	0	0	0

Sowing time : Mid October to last week of November

Sowing method : Two rows of chickpea alternate with two rows of mustard at 30cm apart

Fertilizer : All fertilizer as basal

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Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
Medium highland AEZ: 11, 16, 26	Rabi (Rainfed)	Wheat (67%) + Chickpea (33%)	3.00 + 0.70	60	20	25	0	0	0	0	0

Sowing time : Mid November to last week of November

Sowing method : Two rows of wheat (20cm apart) alternate with one row of chickpea

Fertilizer : All fertilizer as basal

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
High plain land AEZ: 3, 11	Kharif-II (Rainfed)	Cotton (100%) + Mungbean/ Blackgram	2.00 + 0.80/ 0.90	90	20	45	18	0	0	0	0

Sowing time : 1st week of August to third week of August

Sowing method : Cotton 60cm x 30cm, one row of mungbean/blackgram (30cm apart) in between cotton rows or two rows of mungbean/blackgram (30cm apart) in between paired cotton rows (30cm/30cm/30cm)

Fertilizer : 2/3rd N at 30 & 50 DAS in cotton rows + 1/3rd N & other fertilizers as basal

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
Rainfed highland AEZ: 11a, 19	Kharff-II	Jute (seed) + Radish	1.0 + 16.0	180	26	33	20	0	0	0	0

Sowing time : Mid September

Spacing (jute) : 30cm x 10cm

Fertilizer : 45 kg N at 20 DAE, 45 kg N at 35 DAE

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Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
Medium highland AEZ: 3, 11, 13	Rabi	Groundnut (100%) + Kaon (25%)	1.60-1.80 + 0.50-0.70	30	20	40	0	0	0	0	0

Sowing time : Mid February to Mid March

Sowing method : Groundnut 25cm x 10cm (100%), broadcast Kaon (25%)

Fertilizer : As basal

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
High & medium highland AEZ: 12, 13, 26, 28	Rabi	Groundnut (100%) + Onion/ Garlic (33%)	1.4-1.5 + 4.0	90	44	83	30	4	0	0	0

Sowing time : November to December

Sowing method : Groundnut spacing: 40cm x 10cm, in between 2 normal groundnut rows, two rows of onion/garlic (10cm x 5cm) can be planted

Fertilizer : All basal except 2/3rd N at 20 & 40 DAS

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
High & Medium highland AEZ: 12, 18, 19	Rabi	Groundnut + Sesame	1.20 + 0.50	13	28	42	30	2	1.7	0	0

Sowing time : Middle of February to end of March (Kharif-I), Middle of August to September (Kharif-II)

Sowing method : Three rows of groundnut (25cm x 10cm) in between paired rows of sesame (30cm in continuous)

Fertilizer : All fertilizer as basal except 9 kg/ha of N as top dressed in sesame row 25 DAS.

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Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
High & medium highland AEZ: 13, 14, 18	Rabi	Sunflower + Soybean	1.4-1.5 + 0.50	50	30	80	30	4	2	0	0

Sowing time : Mid December
Sowing method : Two rows of Soybean (30cm in continuous line) in between paired rows of sunflower (40cm)
Fertilizer : All fertilizer as basal except 50% of N in two installments at 25 and 50 DAS.

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
Medium highland & Medium land AEZ: 1, 3, 15, 25	Rabi	Potato (100%) + Vegetables (Lalshak/Spinach)	25.0-30.0 + 2.0-3.0	120	40	110	15	0	1	0	2-6

Sowing time : 1st week of November – 3rd week of November
Sowing method : Potato 60cm x 30cm, two rows of lalshak/spinach (30cm apart) in between paired cotton rows
Fertilizer : 1/3rd N and other fertilizers as basal, 1/3rd N 25 at DAS & rest N at 45-55 DAS in potato rows
Note : The dose of N, P & K may be reduced based on quantity of CD to be applied and as per Appendix-6

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
Rainfed highland AEZ: 3, 8d, 15, 25, 28	Rabi	Potato + Red amaranth + Sweet gourd	22.0 + 2.0 + 2.50	90	15	40	12	0	1	0	2-6

Sowing time : Mid December
Spacing : Potato 60cm x 25cm
Sowing method : Red amaranth: Broadcast, Sweet gourd in pit
Fertilizer : 2/3rd N & other fertilizer as basal and rest 1/3rd N at 30 DAP in potato rows
Note : The dose of N, P & K may be reduced based on quantity of CD to be applied and as per Appendix-6

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Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
Rainfed highland AEZ: 3d	Rabi + Kharif	Blackgram (GM) + Potato + Garlic/ Palwal	7-10 (biomass) + 18-20 + 1.5 (bulb)/ 6.0 (fruit)	0 + 80	0 + 18	0 + 66	0 + 10	0	0	0	5

Sowing time : Blackgram: Late September
Potato: Last week of November
Garlic- Late March, Palwal: April to August

Sowing method : Potato 60cm x 30cm and Garlic: 40cm x 10cm Palwal: 180cm x continuous

Fertilizer : Potato: 20 kg N at 30 DAS, 20 kg N at 50 DAS and rest 40 kg N & other fertilizer as basal

Note : The dose of N, P & K may be reduced based on quantity of CD to be applied and as per Appendix-6

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
High & medium highland AEZ: 3, 19, 28	Rabi	Cabbage (100%) + Tomato (25%)	60-70 + 10-15	110	25	70	15	0	0	0	12

Sowing time : Last week of October to Mid November

Sowing method : Cabbage 60cm x 45cm, in between cabbage rows one row of tomato (45cm spaced)

Fertilizer : Cowdung 50% al pit, rest 50% cowdung and P at final land preparation, N and K at 15-20 DAS and 35 DAS as top dress

Note : The dose of N, P & K may be reduced based on quantity of CD to be applied and as per Appendix-6

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
Medium highland AEZ: 3, 7, 9, 28	Rabi	Banana + Dhaincha	20.0-25.0 + 20.0-25.0 (biomass)	130	20	86	30	0	0	0	12

Spacing : Banana pit size: 0.6m x 0.6m x 0.4m

Fertilizer : In Banana: Two weeks before planting/pit: cowdung 5 kg, TSP 25 g, MP 25 g, Three month after planting/pit: Urea 25 g, MP 25 g

Note : The dose of N, P & K may be reduced based on quantity of CD to be applied and as per Appendix-6

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Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
High & medium highland AEZ: 1a, 11a, 25a	Rabi	T. Sugarcane (100%) + Onion	100.0 ±10.0 8.0±0.8	150 75	50 30	100 75	30 30	20 -	- -	- -	- -

***Only in Mg deficient areas**

Spacing : Sugarcane: 100cm x 45cm, Onion: 30cm x 10cm

Sowing method : Bulb of onion planted in two rows between Sugarcane

Fertilizer : For Sugarcane: 50 kg N 20 DAT, 50 N 40 K kg at 4-6 tiller stage, 50 N 40 K at earthing up. For Onion, all fertilizer as basal

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
High and medium highland AEZ: 1a, 11a, 25a	Rabi & Kharif	Sugarcane (paired row) + Potato + Kangkong	100.0±10.0 10.0 ±1.0 10.0 ±1.0	150 70 28	50 15 28	100 60 30	30 - 2	20 - -	- - -	- - -	- - -

***Only in Mg deficient areas**

Sowing time : Sugarcane: Mid October to Mid November
Potato: Mid October to Mid November
Gimakalmi: February to April

Spacing : Sugarcane: 60cm between two rows and 140 cm between two paired rows. Plant to plant 45cm. Three lines of potato and kangkong in 30cm between 2 paired rows of Sugarcane.

Fertilizer : Sugarcane: 50 kg N at 20 DAT, 50 kg N and 40 K at 4-6 tillering, 50 N and 40 K at earthing up.
Potato: 40 kg N at earthing up
Kangkong: 10 kg N after 1st harvest and 10 kg N at 2nd harvest

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Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
High & medium highland AEZ: 1a, 11a, 25a	Rabi + Kharif	Sugarcane (paired row) + Potato + Red amaranth	100.0±1.0 10.0±1.0 6.0±0.6	150 70 23	50 15 5	100 60 25	30 - 2	20	-	-	-

***Only in Mg deficient areas**

Sowing time : Sugarcane: Mid October to Mid November
Potato: Mid October to Mid November
Red amaranth: February to March

Spacing : Sugarcane: 60cm between two rows and 140 cm between two paired rows. Plant to plant 45cm.

Fertilizer : Sugarcane: 50 kg N at 20 DAT, 50 kg N and 40 K at 4-5 tillering, 50 N and 40 K at alternative earthing up.
Potato: 40 kg N at earthing up
Red amaranth: 10 kg N at 20 DAS

Land and soil characteristics	Cropping pattern		Yield Goal (t/ha)	Fertilizer Recommendation (kg/ha)							CD (t/ha)
				N	P	K	S	Mg	Zn	B	
High & medium highland AEZ: 1a, 11a, 25a	Rabi + Kharif	Sugarcane (paired row) + Potato + Mungbean	100.0±10.0 10.0±1.0 0.7±0.07	150 70 7	50 15 7	100 60 5	30 - -	20 - -	- - -	- - -	- - -

***Only in Mg deficient areas**

Sowing time : Sugarcane: Mid October to Mid November
Potato: Mid October to Mid November

Spacing : Sugarcane: 60cm between two rows and 140 cm between two paired rows. Plant to plant 45cm.

Fertilizer : Soybean: 50 kg N at 20 DAT, 50 kg N and 40 K at 4-6 tillering, 50 N and 40 K at earthing up.
Potato: 30 kg N at earthing up
Mungbean: All as basal

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11. APPENDICES

Appendix -1 : Fertilizer sales (ton) by product and year from 1980-81 to 2004-05 in Bangladesh

Year	Urea	TSP	SSP	DAP	MOP	Gypsum	Zinc	AS	Others	Total
1980-81	559.766	215.061	-	41.736	45.204	-	183	-	13.229	875.179
1981-82	518.775	208.478	-	48.518	44.836	-	810	-	7.906	829.323
1982-83	629.058	205.999	-	73.161	50.420	393	498	-	8.889	968.418
1983-84	708.070	260.730	-	93.831	63.222	1.267	745	-	1.196	1.129.061
1984-85	831.801	345.670	-	403	69.271	1.379	1.217	-	10.480	1.260.221
1985-86	794.496	297.418	-	53	59.867	3.269	706	-	178	1.155.987
1986-87	915.019	335.659	-	-	65.850	2.824	1.353	-	238	1.320.943
1987-88	1.029.077	390.159	-	-	86.139	1.390	1.639	6.796	-	1.515.191
1988-89	1.135.062	415.993	-	-	94.172	60.745	2.800	93	173	1.709.038
1989-90	1.369.237	479.767	718	-	118.663	67808	5.180	1.785	18	2.043.176
1990-91	1.323.397	514.761	12.120	-	149.761	101.782	2.743	2.763	211	2.107.538
1991-92	1.533.481	456.672	36.201	-	137.135	115.334	3.805	4.797	-	2.287.425
1992-93	1.547.407	407.002	119.828	2.010	126.083	108.140	722	4.992	-	2.316.184
1993-94	1.578.955	234.185	170.608	28.675	103.875	86.051	5.200	10.036	97	2.217.682
1994-95	1.748.459	122.947	533.485	1.837	154.240	77.161	-	2.491	-	2.640.620
1995-96	2.045.535	111.095	596.881	-	155.881	103.577	1.029	8.692	-	3.022.690
1996-97	2.119.883	72.629	525.285	-	219.302	86.611	1.161	11.692	-	3.036.563
1997-98	1.872.725	62.382	473.295	6.778	193.496	113.430	661	9.716	-	2.732.483
1998-99	1.902.024	170.247	362.370	38.633	210.784	128.215	269	12.418	-	2.824.924
1999-00	2.151.233	259.263	237.201	109.171	239.464	189.398	1.170	26.003	-	3.212.903
2000-01	2.121.096	399.428	138.589	90.077	123.788	102.260	3.006	13.020	-	2.991.264
2001-02	2.247.422	401.464	127.126	127.033	233.249	115.578	238	20,083	12.876	3.285.069
2002-03	2.247.000	375.130	132.527	122.010	270.620	150.520	5.00	10.000	26.000	3.338.807
2003-04	2.324.080	361.000	148.000	90.000	240.000	140.000	7.000	9.000	45.000	3.364.080
2004-05	2.523.395	420.029	170.931	140.718	260.385	135.704	8.000	5.592	90.000	3.754.754

Source: Monthly report FDI-11 and ATDP/IFDC and MOA, MMI

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Appendix –2 : Nutrient compositions (%) of some commonly used chemical fertilizers

Source	*Formula*	N	P	K	S	Ca	Mg	Mn	Zn	B	Mo
Urea	$CO(NH_2)_2$	46	-	-	-	-	-	-	-	-	-
Ammonium sulphate	$(NH_4)_2SO_4$	21	-	-	24	-	-	-	-	-	-
Triple super phosphate	$Ca(H_2PO_4)_2$	-	20	-	1.3	14	-	-	-	-	-
Single super phosphate	$Ca(H_2PO_4)_2$ + $CaSO_4.2H_2O$	-	8	-	12	20	-	-	-	-	-
Diammonium phosphate	$(NH_4)_2HPO_4$	18	20	-	-	-	-	-	-	-	-
Muriate of potash	KCl	-	-	50	-	-	-	-	-	-	-
Potassium sulphate	K_2SO_4	-	-	42	18	-	-	-	-	-	-
Magnesium sulphate	$MgSO_4.7H_2O$	-	-	-	13	-	9.5	-	-	-	-
Zinc sulphate, Monohydrate	$ZnSO_4.H_2O$	-	-	-	18	-	-	-	36	-	-
Zinc sulphate, Heptahydrate	$ZnSO_4.7H_2O$	-	-	-	18	-	-	-	23	-	-
Zinc oxide	ZnO	-	-	-	-	-	-	-	78	-	-
Managanese sulphate	$MnSO_4.H_2O$	-	-	-	21	-	-	36	-	-	-
Gypsum	$CaSO_4.2H_2O$	-	-	-	18	33	-	-	-	-	-
Ammonium molybdate	$(NH_4)_6Mo_7O_{24}.2H_2O$	6.8	-	-	-	-	-	-	-	-	54
Solubor	$Na_2B_80_{13}.4H_20$	-	-	-	-	-	-	-	-	20	-
Boric acid	H_3BO_3	-	-	-	-	-	-	-	-	17	-

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Appendix –3 : Trends in fertilizer nutrient use in selected South and Southeast Asian countries (kg/ha/yr)

Country	1973	1978	1983	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Bangladesh	18	33	48	73	93	98.9	103	100	98	108	115	126	134.6	140.5	161.7	156.3
China	64	108	184	262	265	282	308	306	264	309	280	260	263.3	264.7	269.2	256.6
India	17	30	46	65	69	71	75	72	73	80	85	90	95.4	99.0	106.4	98.6
Indonesia	26	39	75	113	109	78.2	83	78	86	85	80	70	71.5	85.9	78.9	73.8
Korea DPR	177	345	345	338	407	416.2	403	387	390	376	300	90	85.6	78.6	136.0	175.5
Malaysia	58	77	116	151	164	130.9	134	130	126	158	160	162	164.6	184.9	190.4	187.8
Mayanmar	4	9	16	8	9	7.5	8	9	15	17	17	17	17.5	16.9	15.8	20.0
Nepal	-	-	-	-	-	30.9	15	20	25	30	32	35	36.2	40.9	28.6	25.6
Pakistan	21	44	59	83	91	90.4	90	102	101	102	110	115	121.0	117.3	129.5	135.1
Philippines	35	41	46	65	68	59.4	48	55	61	65	70	75	81.7	62.8	74.1	73.1
R. of Korea	338	392	331	441	441	454.1	454	466	474	467	480	500	515.6	453.9	425.8	407.3
Sri Lanka	58	72	87	97	106	90.1	93	96	112	113	110	110	110.5	123.3	136.0	128.9
Thailand	10	16	25	39	39	50.7	41	50	58	61	70	75	80.5	89.5	97.2	86.1
Viet Nam	41	52	64	68	83	87.8	116	135	134	174	190	200	204.3	254.5	265.3	285.3
Australia						24.3	25	25	30	35	40	45	45.6	47.0	48.9	47.7
Japan						348.2	250	255	260	270	275	280	286.0	268.7	272.7	298.8
New Zealand						89.5	90	110	120	140	150	160	169.0	172.6	186.0	255.5

Source: Selected Indicators of Food and Agriculture Development in Asia-Specific R140egion (1991-2001), RAP Publication: 2002/19, Bangkok, October 2002.

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Appendix-4 : Nutrient concentration in different organic manure/materials

Manure	Moisture (%)	N (%)	P (%)	K (%)	S (%)
Cowdung (fresh)	60±6.0	0.5±0.05	0.15±0.15	0.5±0.05	
Cowdung (decomposed)	35±3.5	1.2±0.12	1.0±0.1	1.6±0.16	0.13±0.01
Farmyard manure	67±6.7	1.6±0.16	0.83±0.08	1.7±0.17	0.56±0.06
Poultry manure	55±5.5	1.9±0.19	0.56±0.06	0.75±0.07	1.1±0.11
Compost (rural)	40±4.0	0.75±0.07	0.6±0.06	1.0±0.1	-
Compost (urban)	40±4.0	1.5±0.15	0.6±0.06	1.5±0.5	-
Compost (water hyacinth)	70±7.0	1.5±0.15	0.8±0.08	3.0 ±0.3	-
Mustard oilcake	15±1.5	5.0±0.5	1.8±0.18	1.2±0.12	-
Linseed oilcake	15±1.5	5.5±0.55	1.4±0.14	1.2±0.12	-
Sesame oilcake	15±1.5	6.2±0.62	2.0±0.2	1.2±0.12	-
Groundnut oilcake	-	7.0±0.7	1.5±0.15	1.3±0.13	-
Pressmud	55±5.5	1.85±0.18	0.13±0.02	0.54±0.05	0.56±0.06
Bone meal (raw)	8±0.8	3.5±0.35	9±0.9	-	-
Bone meal (steamed)	7±0.7	1.5±0.15	10±1.0	-	-
Dried blood	10±1.0	11±1.1	1.1±0.11	0.7±0.07	-
Fishmeal	10±1.0	7±0.70	3.5±0.35	1.0±0.10	-

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Appendix-5 : Nutrient concentration in green manure and crop residues

Green manure/ crop residues	Moisture (%)	N (%)	P (%)	K (%)	S (%)
Dhaincha	80±8	0.7±0.07	0.4±0.04	0.4±0.04	0.2±0.02
Mungbean	70±7	0.8±0.08	0.2±0.02	0.5±0.05	0.3±0.03
Blackgram	70±7	0.8±0.08	0.2±0.02	0.5±0.05	0.3±0.03
Cowpea	70±7	0.7±0.07	0.15±0.01	0.5±0.05	-
Sunhemp	70±7	0.7±0.07	0.12±0.01	0.5±0.05	-
Rice straw	30±3	0.4±0.04	0.1±0.01	1.5±0.15	-
Wheat straw	20±2	0.5±0.05	0.3±0.03	0.9±0.09	-
Sugarcane leaves	20±2	1.0±0.1	0.5±0.05	1.4±0.14	-

Appendix-6 : Nutrient supply from organic materials.

Organic material	Nutrient supply (kg) from 1 ton material		
	N	P	K
Cowdung (decomposed)	4.5	1.5	5.0
Farmyard Manure	3.0	0.7	2.5
Poultry Manure	11.5	10.5	7.0
Compost (rural)	2.5	1.0	3.0
Mustard oilcake	25.5	4.0	5.0
Linseed oilcake	28.0	3.0	5.0
Sesame oilcake	31.5	4.5	5.0
Groundnut oilcake	36.0	3.5	5.5
Bone meal	19.5	52.0	-
Dried blood	59.5	2.5	3.0
Dhaincha (Sesbania)	2.5	0.3	2.0
Mungbean residues	4.5	0.5	4.5
Rice straw	2.0	0.5	6.5
Wheat straw	3.0	0.5	5.5

Note : The values estimated considering the nutrient concentration in the material (Appendix-4 & 5) and their mineralization.

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Appendix-7 : Inoculant and seed requirement of different legumes

Crop	Seed rate (kg/ha)	Inoculum rate	
		g/kg seed	kg/ha
Lentil	30	50	1.5
Chickpea	50	40	2.0
Mungbean	30	50	1.5
Blackgram	30	50	1.5
Cowpea	40	40	1.6
Grasspea	50	40	2.0
Groundnut (shelled)	72	30	2.2
Soybean	60	20	1.2

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Appendix-8 : Interpretation of soil test values based on critical limits

A: Loamy to Clayey Soils of Upland Crops

Nutrient element*	Very Low	Low	Medium	Optimum	High	Very high
N (%)	< 0,09	0.091-0.18	0.181-0.27	0.271-0.36	0.361-0.45	>0.45
P (µg/g soil) (Olsen method)	< 7.5	7.51-15.0	15.1-22.5	22.51-30	30.1-37.5	>37.5
P (µg/g) (Bray & Kurtz method)	< 5.25	5.25-10.5	10.51-15.75	15.76-21.0	21.1-26.25	>26.25
S (µg/g) soil	< 7.5	7.51-15.0	15.1-22.5	22.51-30	30.1-37.5	>37.5
K (meq/100g)	< 0.09	0.091-0.18	0.181-0.27	0.271-0.36	0.361-0.45	>0.45
Ca (meq/100g)	< 1.5	1.51-3.0	3.1-4.5	4.51-6.0	6.1-7.5	>7.5
Mg (meq/100g)	< 0.375	0.376-0.75	0.751-1.125	1.126-1.5	1.51-1.875	>1.875
Cu (µg/g)	< 0.15	0.151-0.3	0.31-0.45	0.451-0.6	0.61-0.75	>0.75
Zn (µg/g)	< 0.45	0.451-0.9	0.91-1.35	1.351-1.8	1.81-2.25	>2.25
Fe (µg/g)	< 3.0	3.1-6.0	6.1-9.0	9.1-12.0	12.1-15.0	>15.0
Mn (µ/g)	< 0.75	0.756-1.5	1.51-2.25	2.256-3.0	3.1-3.75	>3.75
B (µg/g)	< 0.15	0.151-0.3	0.31-0.45	0.451-0.6	0.61-0.75	>0.75
Mo (µg/g)	< 0.075	0.076-0.15	0.151-0.225	0.226-0.30	0.31-0.375	>0.375

Nutrient Element*	Critical limit	Method of extraction
N (%)	0.12	Kjeldahl method
Organic C(%)	C:N=10:1	Wet oxidation method
P (µg/g)	10.0	Modified Olsen method (Neutral + Calcareous soils)
P (µg/g)	7.0	Bray & Kurtz method (Acid soils)
S (µg/g)	10.0	Calcium dihydrogen phosphate extraction
K (meq/100g)	0.12	N NH_4OAc method
Ca (meq/100g)	2.0	N NH_4OAc method
Mg (meq/100g)	0.5	N NH_4OAc method
Zn (µ/g)	0.6	DTPA extraction
Fe (µg/g)	4.0	DTPA extraction
Mn (µg/g)	1.0	DTPA extraction
B (µg/g)	0.2	Calcium chloride extraction
Mo (µg/g)	0.1	NH_4-oxalate extraction

indicates total status for N and available status for others

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B: Sandy Soils for Upland Crops

Nutrient element*	Very Low	Low	Medium	Optimum	High	Very high
N (%)	< 0.075	0.076-0.15	0.151-0.226	0.227-0.30	0.31-0.375	>0.375
P (µg/g) (Olsen method)	< 6.0	6.1-12.0	12.1-18.0	18.1-24.0	24.1-30.0	>30.0
P (µg/g soil) (Bray & Kurtz method)	< 5.25	5.25-10.5	10.51-15.75	15.76-21.0	21.1-26.25	>26.25
S (µg/g)	< 6.0	6.1-12.0	12.1-18.0	18.1-24.0	24.1-30.0	>30.0
K (meq/100g)	< 0.06	0.061-0.12	0.121-0.18	0.181-0.24	0.241-0.3	>0.3
Ca (meq/100g)	<1.5	1.51-3.0	3.1-4.5	4.51-6.0	6.1-7.5	>7.5
Mg (meq/100g)	< 0.375	0.376-0.75	0.751-1.125	1.126-1.5	1.51-1.875	>1.875
Cu (µg/g)	< 0.15	0.151-0.3	0.31-0.45	0.451-0.6	0.61-0.75	>0.75
Zn (mg/g)	< 0.375	0.376-0.75	0.751-1.125	1.126-1.5	1.51-1.875	>1.875
Fe (µg/g)	< 2.25	2.26-4.5	4.51-6.75	6.76-9.0	9.1-11.25	>11.25
Mn (µg/g)	< 0.75	0.756-1.5	1.51-2.25	2.256-3.0	3.1-3.75	>3.75
B (µg/g)	< 0.12	0.121-0.24	0.241-0.36	0.361-0.48	0.481-0.6	>0.6
Mo (µg/g)	< 0.045	0.046-0.09	0.091-0.135	0.136-0.18	0.181-0.225	>0.225

Nutrient Element*	Critical limit	Method of extraction
N (%)	0.10	Kjeldahl method
Organic C(%)	C:N=10:1	Wet oxidation method
P (µg/g)	8.0	Modified Olsen method (Neutral + Calcareous soils)
P (µg/g)	7.0	Bray & Kurtz method (Acid soils)
S (µg/g)	8.0	Calcium dihydrogen phosphate extraction
K (meq/100g)	0.08	N NH4OAc method
Ca (meq/100g)	2.0	N NH4OAc method
Mg (meq/100g)	0.5	N NH4OAc method
Zn (µ/g)	0.5	DTPA extraction
Cu (µg/g)	0.2	DTPA extraction
Fe (µg/g)	3.0	DTPA extraction
Mn (µg/g)	1.0	DTPA extraction
B (µg/g)	0.16	Calcium chloride extraction
Mo (µg/g)	0.06	NH4-oxalate extraction

indicates total status for N and available status for others

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C: Loamy to Clayey Soils of Wetland Rice Crops

Nutrient element*	Very Low	Low	Medium	Optimum	High	Very high
N (%)	< 0.09	0.091-0.18	1.181-0.27	0.271-0.36	0.361-0.45	>0.45
P (µg/g) (Olsen method)	< 6.0	6.1-12.0	12.1-18.0	18.1-24.0	24.1-30.0	>30.0
P (µg/g) (Bray & Kurtz method)	< 3.75	3.76-7.5	7.6-11.25	11.26-15.0	15.1-18.75	>18.75
S (µg/g)	< 9.0	9.1-18.0	18.1-27.0	27.1-36.0	36.1-45.0	>45.0
K (meq/100g)	< 0.075	0.076-0.15	0.151-0.225	0.226-0.30	0.31-0.375	>0.375
Ca (meq/100g)	< 1.5	1.51-3.0	3.1-4.5	4.51-6.0	6.1-7.5	>7.5
Mg (meq/100g)	< 0.375	0.376-0.75	0.751-1.125	1.126-1.5	1.51-1.875	>1.875
Cu (µg/g)	< 0.15	0.151-0.3	0.31-0.45	0.451-0.6	0.61.0.75	>0.75
Zn (µg/g)	< 0.45	0.451-0.9	0.91-1.35	1.351-1.8	1.81-2.225	>2.25
Fe (µg/g)	< 3.0	3.1-6.0	6.1-9.0	9.1-12.0	12.1-15.0	>15.0
Mn (µg/g)	< 0.75	0.756-1.5	1.51-2.25	2.256-3.0	3.1-3.75	>3.75
B (µg/g)	< 0.15	0.151-0.3	0.31-0.45	0.451-0.6	0.61-0.75	>0.75
Mo (µg/g)	< 0.075	0.076-0.15	0.151-0.225	0.226-0.30	0.31-0.375	>0.375

Nutrient Element*	Critical limit	Method of extraction
N (%)	0.12	Kjeldahl method
Organic C(%)	C:N=10:1	Wet oxidation method
P (µg/g)	8.0	Modified Olsen method (Neutral + Calcareous soils)
P (µg/g)	5.0	Bray & Kurtz method (Acid soils)
S (µg/g)	10.0	Calcium dihydrogen phosphate extraction
K (meq/100g)	0.12	N NH_4OAc method
Ca (meq/100g)	2.0	N NH_4OAc method
Mg (meq/100g)	0.5	N NH_4OAc method
Zn (µ/g)	0.6	DTPA extraction
Cu (µg/g)	0.2	DTPA extraction
Fe (µg/g)	4.0	DTPA extraction
Mn (µg/g)	1.0	DTPA extraction
B (µg/g)	0.2	Calcium chloride extraction
Mo (µg/g)	0.1	NH_4-oxalate extraction

indicates total status for N and available status for others

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Appendix-9 : Location specific and yield goal basis fertilizer recommendation for crops based on soil test values

For example: Crop-Wheat (High Yield Goal; HYG) = 4.5 ± 0.45 t/ha

Location: Village .....Upazila ..... District .....

Soil analysis	Soil test value	Soil test value interpretation (Appendix- 8A)	Range of values used within the interpretation class (Appendix- 8A)
Texture	Loam	-	-
Total N (%)	0.1	Low	0.091-0.18
Available P (µg/g)	18	Medium	15.1-22.5
Exchangeable K (meq/100g)	0.15	Low	0.091-0.18
Available S (µg/g)	10	Low	7.51-15.0
Available Zn (µg/g)	1.0	Medium	0.91-1.35
Available B (µg/g)	0.2	Low	0.151-0.3

Step-1 : Consult the Appendix-8A to see the position of given soil test value within the range of the interpretation class.

Step-II: Consult the Table 1 under wheat (page # 71) to see the range of fertilizer nutrient recommended for the same soil test value interpretation class.

Step-III: Compute the exact fertilizer nutrient required for making the recommendation following the formula given below:

$$F_r = U_f - \frac{C_i}{C_s} \times (S_t - L_s)$$

Where

F_r = Fertilizer nutrient required for given soil test value
U_f = Upper limit of the recommended fertilizer nutrient for the respective STVI class
C_i = Units of class intervals used for fertilizer nutrient recommendation
C_s = Units of class intervals used for STVI class
S_t = Soil test value
L_s = Lower limit of the soil test value within STVI class

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Example:
N (kg/ha) = $120 - \frac{40}{0.09} \times (0.1-0.091)$

= $120 - \frac{40}{0.09} \times (0.009) = 120 - \frac{40}{9} \times 0.9 = 120 - \frac{36}{9}$

= $120 - 4 = 116$ kg N/ha

= $116 \times \frac{100}{46} = 252.24$ kg Urea/ha

P (kg/ha) = $20 - \frac{10}{7.5} (18-15.1) = 20 - \frac{10}{7.5} \times 2.9$

= $20 - 3.9 = 16.1$ kg P/ha

= $16.1 \times \frac{100}{20} = 80.5$ kg TSP/ha

K (kg/ha) = $90 - \frac{30}{0.09} \times (0.15 - 0.091)$

= $90 - \frac{30}{0.09} \times (0.059) = 90 - \frac{30 \times 5.9}{9}$

= $90 - 19.7 = 70.3$ kg k/ha

= $70.3 \times \frac{100}{50} = 140.6$ kg KCI/ha

S (kg/ha) = $15 - \frac{5}{7.5} \times (10 - 7.51) = 15 - \frac{5}{7.5} \times 2.49$

= $13.34 \times \frac{100}{18} = 74.11$ kg Gypsum/ha

Zn (kg/ha) = $1.3 - \frac{1.3}{0.45} \times (1.0-0.91) = 1.3 - \frac{1.3}{0.45} \times 0.09 = 1.3 - 0.26$

= 1.04 kg Zn/ha $= 1.04 \times \frac{100}{36} = 2.9$ kg Zinc sulphate, monohydrate/ha

B (kg/ha) = $0.6 - \frac{0.3}{0.15} \times (0.2 - 0.151)$

= $0.6 - \frac{0.3}{0.15} \times (0.049) = 0.6 - 0.098 = 0.502$ kg B/ha

= $0.502 \times \frac{100}{17}$ kg Boric acid/ha = 2.95 kg Boric acid/ha

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Note:

When zinc sulphate is used there is also sulphur supplied (approximately 18% S in $ZnSO_4.H_2O$). Thus if 2.9 kg of zinc sulphate is used

$$\frac{2.9 \times 18}{100} = 0.52 \text{ kg of S will be added per hectare}$$

Thus the requirement from the example above can be reduced to (13.34 – 0.52) = 12.82 S/ha. The new calculation for sulphur from gypsum would then be

$$\frac{100 \times 12.82}{18} = 71.2 \text{ kg gypsum/ha}$$

The Final Recommendation

From the above example, the final recommendation would be

Nutrient (kg/ha)	**Fertilizer (kg/ha)**	**Fertilizer/Nutrient Ratio**
N = 116	Urea = 252.2	2.17
P = 16.1	TSP = 80.5	5.00
K = 70.3	MP = 140.6	2.00
S = 13.34	Gypsum = 71.2	5.56
Zn = 1.04	Zinc sulphate, = 2.9 monohydrate	2.79
B = 0.502	Boric acid = 2.95	5.88

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Appendix-10 : Site specific fertilizer recommendation for crops and cropping patterns on the basis of soil test, yield goal and rationales

Example 1: Boro (MV)-Fallow-T.Aman (MV)

Soil Analysis Interpretation	Texture	pH	N %	P (µg/g)	K (meq/100 g)	S (µg/g)	Zn (µg/g)
	Silt loam	7.0	0.08	11	0.17	12	3.0
		Neutral	Very Low	Low	Medium	Low	Very high

Crops and Yield Goal	Fertilizer recommendation (kg/ha)				
	N	P	K	S	Zn
Boro (HYG) 6.0±0.6 (t/ha)	158	18	38	11	-
Fallow	-	-	-	-	-
T.Aman (HYG) 5.0±0.5 (t/ha)	105	7	24	11	-

Example 2: Mustard (MV) - T.Aus (MV)- T.Aman (MV)

Soil Analysis Interpretation	Texture	pH	N %	P (µg/g)	K (meq/100)	S (µg/g)	Zn (µg/g)	B (µg/g)
	Silt loam	7.0	0.08	11	0.17	12	3.0	0.4
		Neutral	Very Low	Low	Low: *for Upland Crops* Medium: *for rice*	Low	Very high	Medium

Crop and Yield Goal	Fertilizer recommendation (kg/ha)					
	N	P	K	S	Zn	B
Mustard (HYG) 2.0±0.2 (t/ha)	140	30	75	23	-	0.4
T.Aus (HYG) 3.5±0.35 (t/ha)	60	6	15	8	-	-
T.Aman (HYG) 5.0±0.5 (t/ha)	105	7	24	11	-	-

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Appendix-11 : Symbols and Atomic Weights of Some Elements

Element	Symbol	Atomic Weight	Element	Symbol	Atomic Weight
Aluminum	AI	26.98	Magnesium	Mg	24.30
Boron	B	10.81	Manganese	Mn	54.94
Calcium	Ca	40.08	Molybdenum	Mo	95.94
Carbon	C	12.01	Nitrogen	N	14.01
Chlorine	CI	35.453	Oxygen	O	16.00
Cobalt	Co	58.94	Phosphorus	P	30.98
Copper	Cu	63.55	Potassium	K	39.102
Fluorine	F	19.00	Silicon	Si	28.09
Hydrogen	H	1.008	Sodium	Na	22.99
Iodine	I	126.92	Sulfur	S	32.06
Iron	Fe	55.85	Zinc	Zn	65.38

Appendix-12 : Useful Chemical Conversion Factors

N x 1.22 = NH_3	HNO_3 x 0.22 = N
P x 2.29 = P_2O_5	H_3PO_4 x 0.32 = P
P_2O_5 x 0.44 = P	$Ca_3(P0_4)_2$ x 0.20 = P
K x 1.20 = K_2O	KCI x 0.52 = K
K_20 x 0.83 = K	K_2SO_4 x 0.45 = K
Ca x 1.40 = CaO	$CaSO_4$ x 0.29 = Ca
MgO x 0.60 = Mg	$MgCO_3$ x 0.28 = Mg
S x 3.00 = SO_4	H_2SO_4 x 0.33 = S
SO_4 x 0.33 = S	$CaSO_4$ x 0.24 = S

Some useful conversion factors

1 sqm	= $1x10^{-4}$ha	1 ha	= 10,000 sqm
1 kg	= 2.2046 pounds	1 Ib	= 0.4535 kg
	Kg/ha x 0.892		= pound/acre
	Pound/acre x 1.121		= kg/ha

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Appendix-13 : Classification of Soils on the Basis of Organic Matter Content and Cation Exchange Capacity

Class	Organic Matter (%)	Cation Exchange Capacity (meq/100 g)
Very high	>5.5	>30
High	3.5-5.5	16-30
Medium	1.8-3.4	7.6-15
Low	1.0-1.7	3-7.5
Very low	<1.0	<3

Appendix-14 : Classification of Soils on the Basis of Potassium Bearing Minerals in the Clay Fractions

Class	Mica in clay fraction (%)	Mica intensity ratio (100/002)
High	>30	>4
Medium	20-30	2-4
Low	<20	<2

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Appendix-15 : Classification of Soils on the Basis of Soil pH Values

pH	***Soil reaction class***
<4.5	Very strongly acidic
4.6-5.5	Strongly acidic
5.6-6.5	Slightly acid
6.6-7.3	Neutral
7.4-8.4	Slightly alkaline
8.5-9.0	Strongly alkaline
>9.0	Very strongly alkaline

Source: SRDI

Appendix-16 : Classification of Land Type

Highland	Land which is above normal flood-level
Medium highland	Land which normally is flooded up to about 90 cm deep during the flood season
Medium lowland	Land which normally is flooded between 90 and 180 cm deep during the flood season
Lowland	Land which normally is flooded between 180 and 300 cm deep during the flood season
Very lowland	Land which normally is flooded above 300 cm during the flood season

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Appendix-17 : Available Forms of Plant Nutrients

Nutrient	*Available Forms*	Sources
Carbon	CO_2,	Atmosphere
Hydrogen	H_2O, H^+	Soil Water
Oxygen	H_2O, O_2	Soil, Atmosphere
Nitrogen	NO_3^-, NH_4^+	Soil Organic Matter, Fertilizers
Phosphorus	$H_2PO_4^-$, HPO_4^{-2}, PO_4^{-3}	Soil Organic Matter, Fertilizers, Minerals
Potassium	K^+	Soil Organic Matter, K-bearing Minerals, Fertilizers
Sulphur	SO_4^{-2}, So3^{-2}	Soil Organic Matter, Minerals, Fertilizers
Calcium	Ca^{+2}	Minerals, Fertilizers, Lime
Magnesium	Mg^{+2}	Minerals, Fertilizers, Lime
Iron	Fe^{+2}, Fe^{+3}	Minerals, Fertilizers
Manganese	Mn^{+2}, Mn^{+4}	Minerals, Fertilizers
Zinc	Zn^{+2}	Minerals, Fertilizers
Copper	Cu^+, Cu^{+2}	Minerals, Fertilizers
Boron	BO_3^{-2}, HBO_3^{-1}	Minerals, Fertilizers
Molydenum	MoO_4^{-3}	Minerals, Fertilizers
Chlorine	C1$^-$	Minerals, Fertilizers

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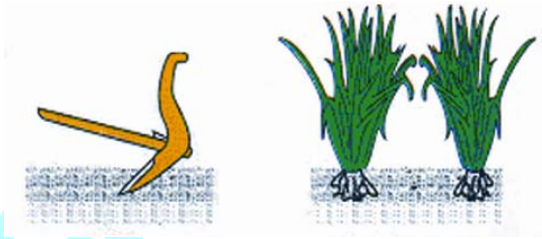
Appendix-18 : Methods of soil sample collection

For continuing sustainable crop harvest from a piece of land, maintenance of soil health is a must. Soil sample analysis can be one of the important criteria for understanding the present nutrient status of the particular field and adjustment of fertilizer recommendation as per need of the soil. As such correct sampling is of great importance. Following pictorial steps through a short brief are given as ideal method for collection of soil sample in our environment.

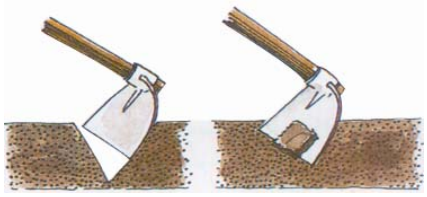
1. Considering the field condition availability and your convenience anyone of the equipments such as country spade, shovel, push auger, Dutch auger etc. can be used.

2. Leave 1.0-1.5 meter distance along the 4 field boundary (ails) of the sample field and demarcate minimum 9 number of sampling spots irrespective of plot size. But more number may give you relatively accurate and precise results.

3. Before start sampling identify the ploughing depth through digging suitable hole in the field. Plough pan, generally present in the transplanted rice field should be discarded during sampling which is located just beneath the plough layer (in general 8-10 cm).



4. Dig a 'V' shaped hole upto the plough pan with a clean country spade/spade/shovel etc. and take a slice of soil having about 7-8 cm almost uniform thickness from one of the vertical side of the hole.



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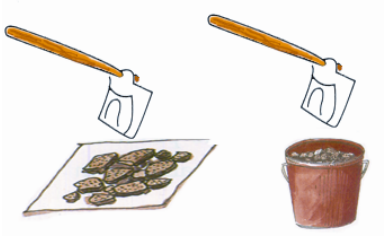
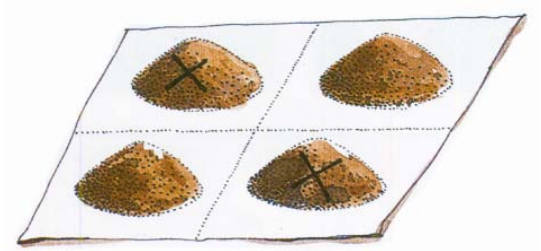
5. Size the sub-samples by discarding excess soil from both the sides of the slice and plough pan at the bottom. Put the soil slice in the bucket or on the plastic sheet. Take care that all the sub-samples you have taken are almost the same volume.

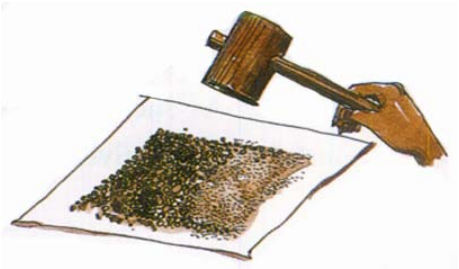


6. Mix the sub-samples (minimum nos. 9) thoroughly and make a composite sample for a field/demo field. Sample should be free from stubbles, grass, rubbish, plan roots, stems etc. if present at this stage.

7. Divide the mixed sample into 4 components over a plastic sheet. Discard any 2 component samples from any two corners and again mix the left two corner's sample. Continue this process until the volume of the sample reaches to about 400-500 gm.



8. From the composite sample take about 500 gms into a plastic bag. The samples should be dried in shaded place and pulverized with a wooden hammer.



9. The plastic bag with soil sample should be tightly closed with thread and placed inside another plastic bag. An information sheet should be placed between two plastic bag and again the bag should be tightly closed with thread. An additional information sheet should be tied at the neck of the bag. The sample should be sent immediately to the laboratory for analysis.

10. Samples should be collected from very close to the road/embankment, brick field, composed/cow dung heap, straw burned area etc. and very recently fertilized land.

Information Sheet

Name of the farmer :	Soil sample no.
Father's Name :	Depth :
Vill/Mouza :	Flooding depth during rain:
Po./Union/Block:	Land type:
Upazila & Dist:	Soil series/dal:
Crops to be cultivated:	
Date of collection:	

Note: Further information on soil sampling and analytical facilities can be obtained from the Upazila Agriculture office, SRDI office and Agricultural Research Institutes.

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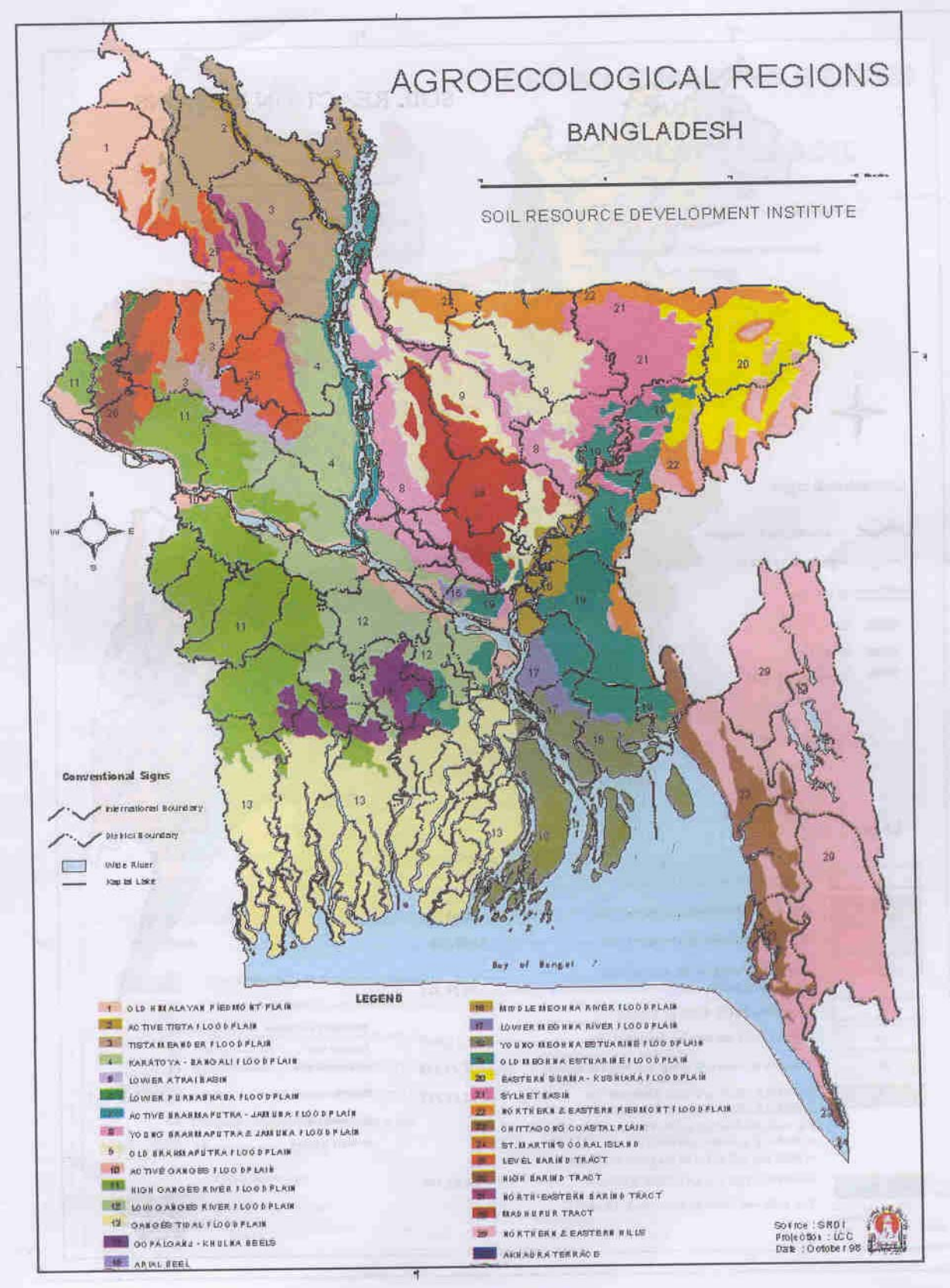
12. AEZ MAP OF BANGLADESH



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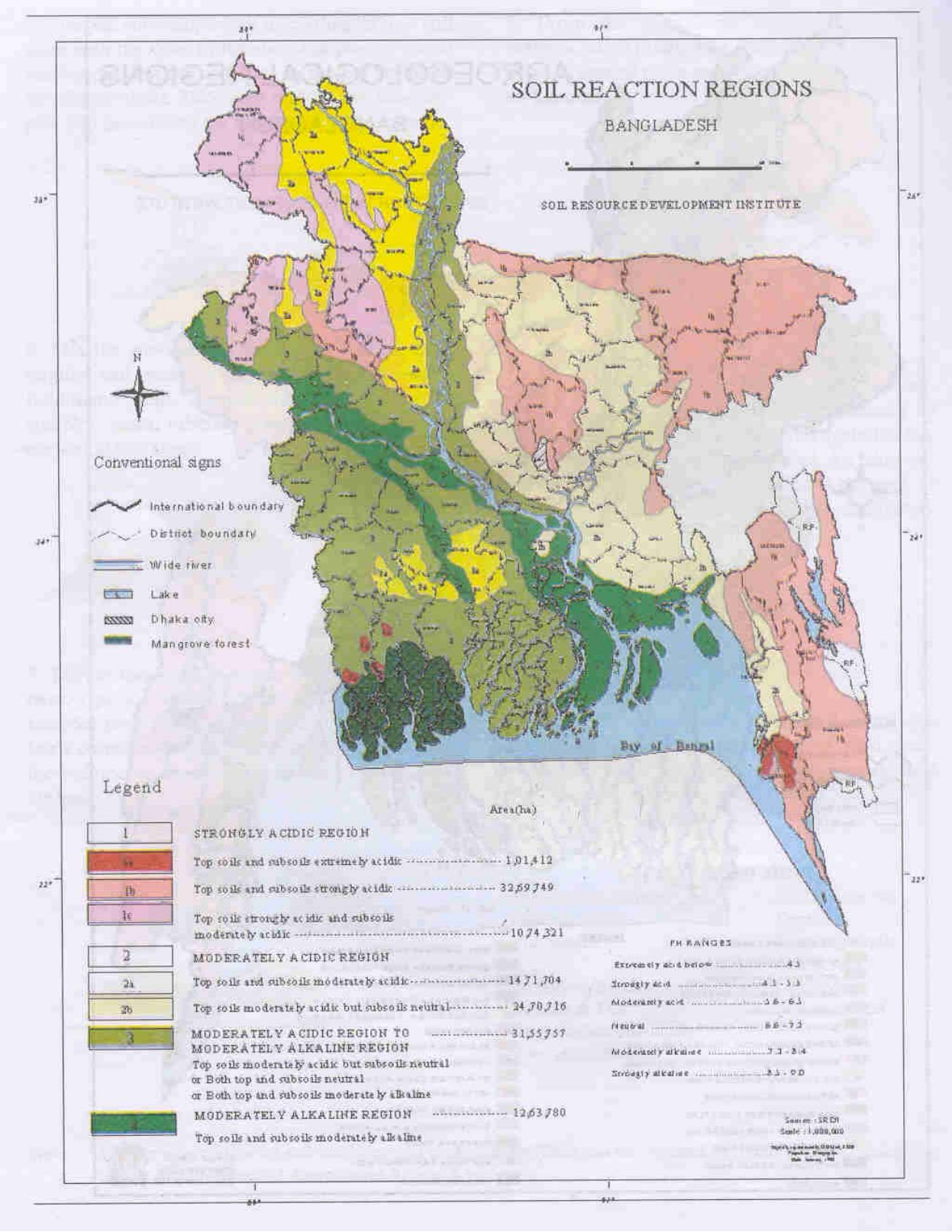
13. MAPS SHOWING THE STATUS OF SOIL pH, ORGANIC METTER, P, K, S, ZN AND B



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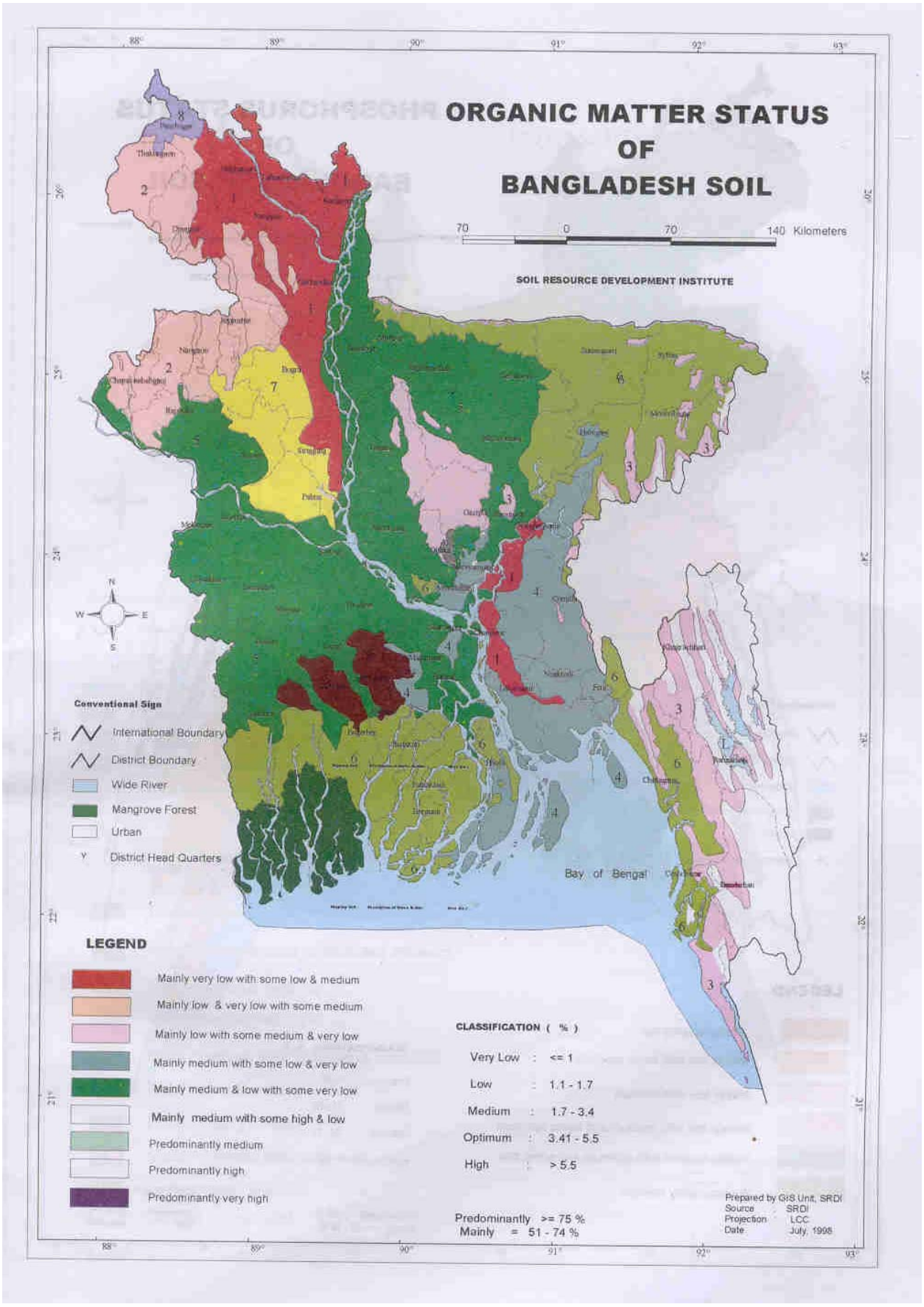

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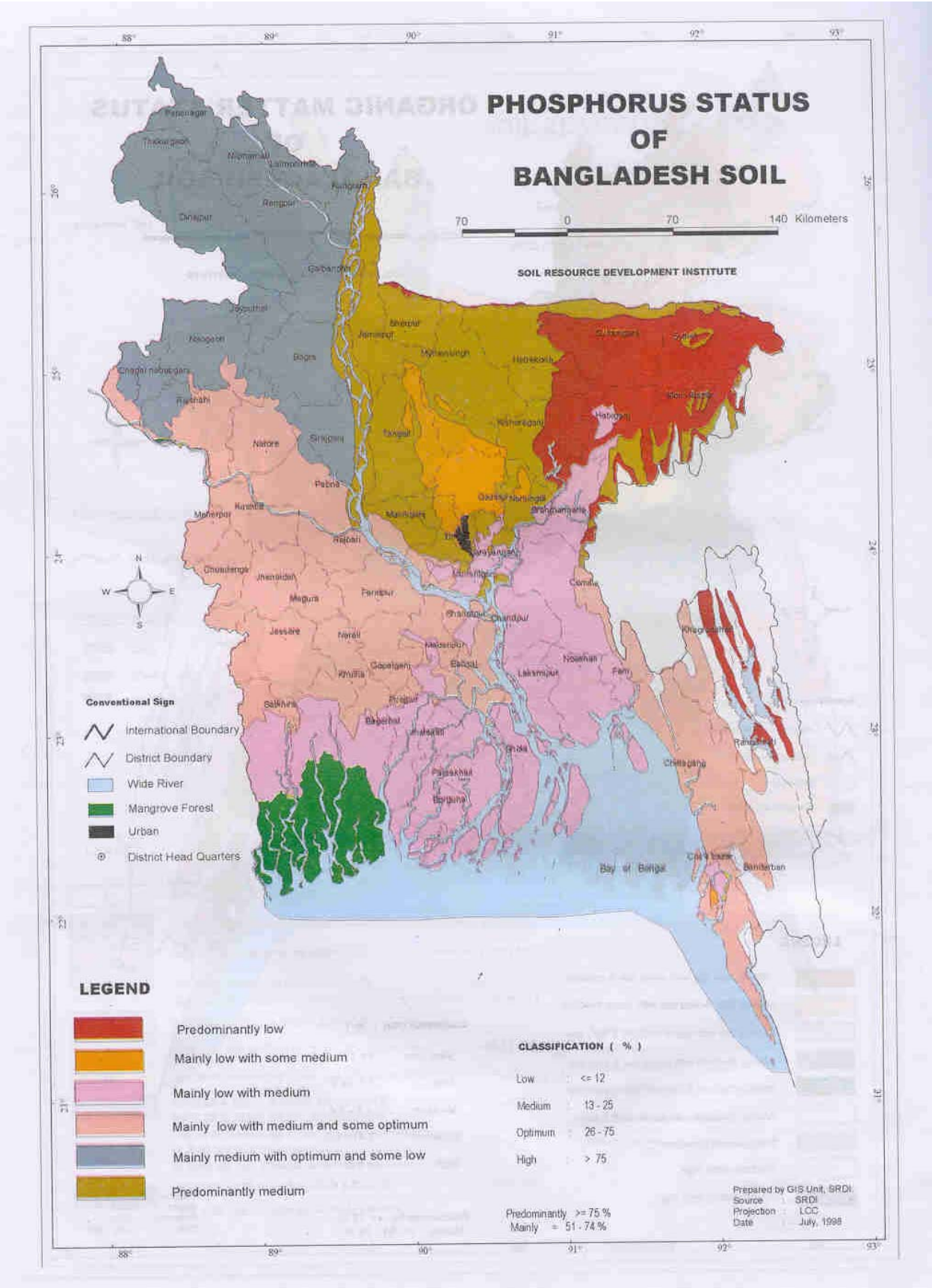

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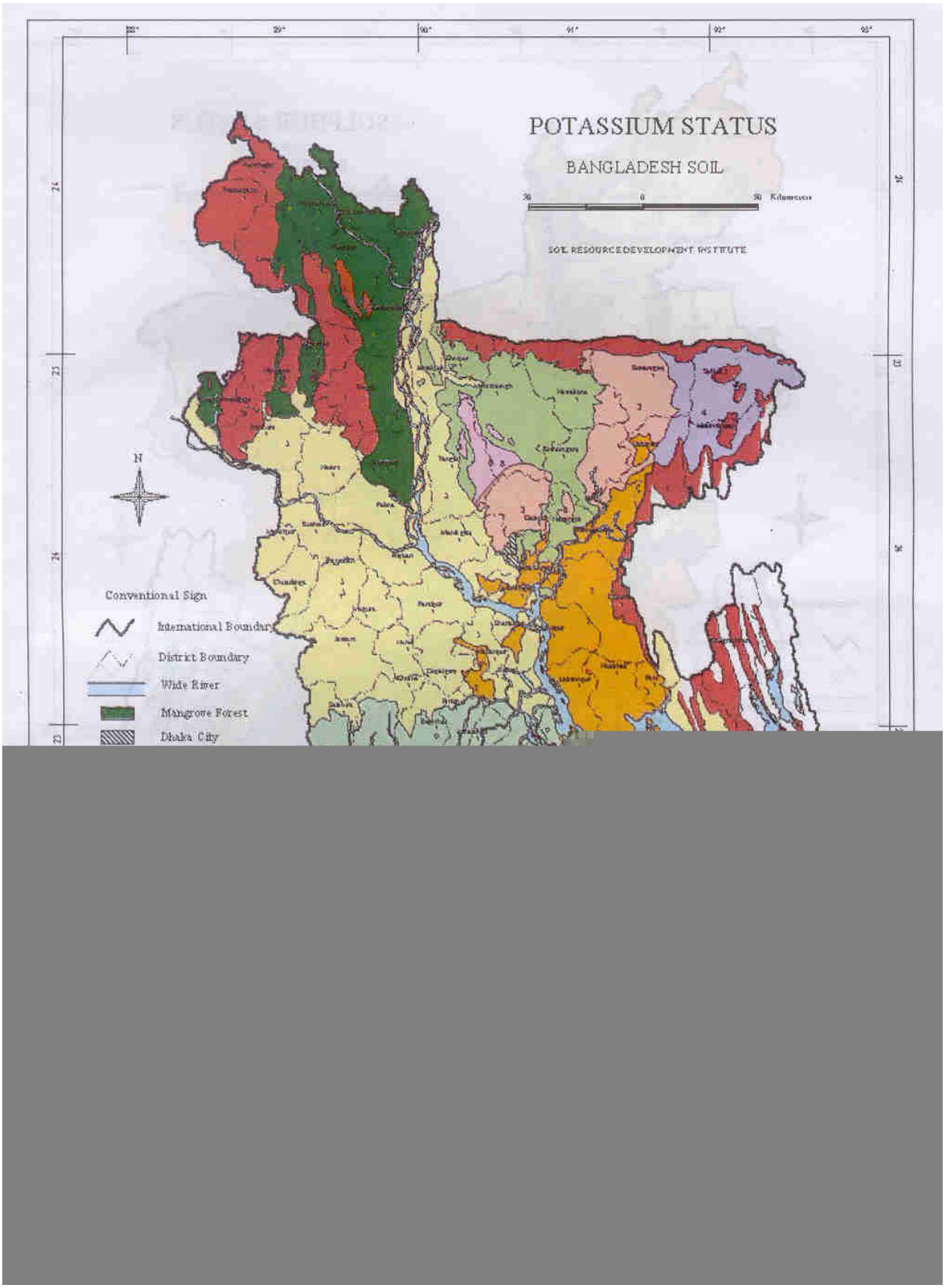

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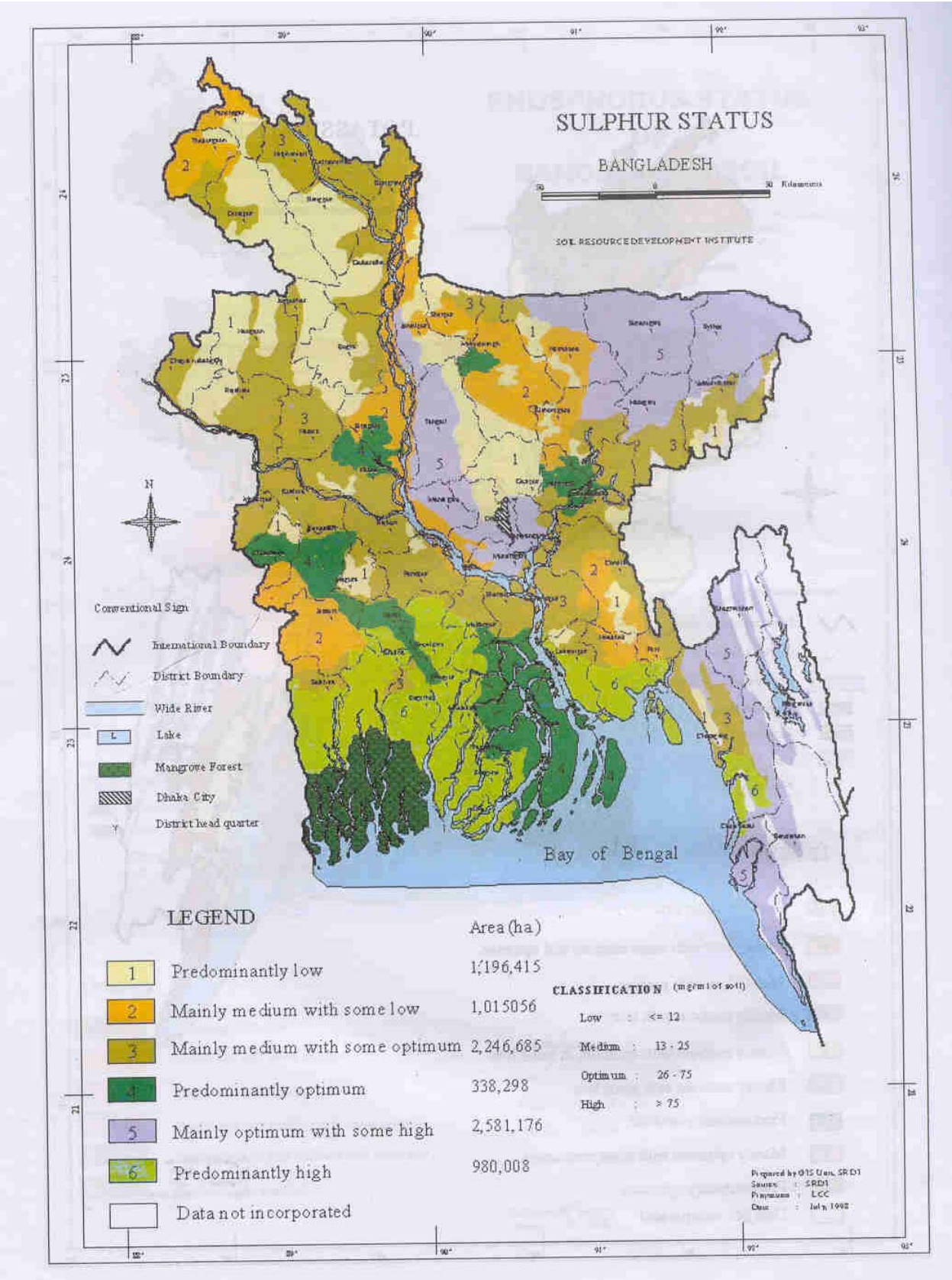

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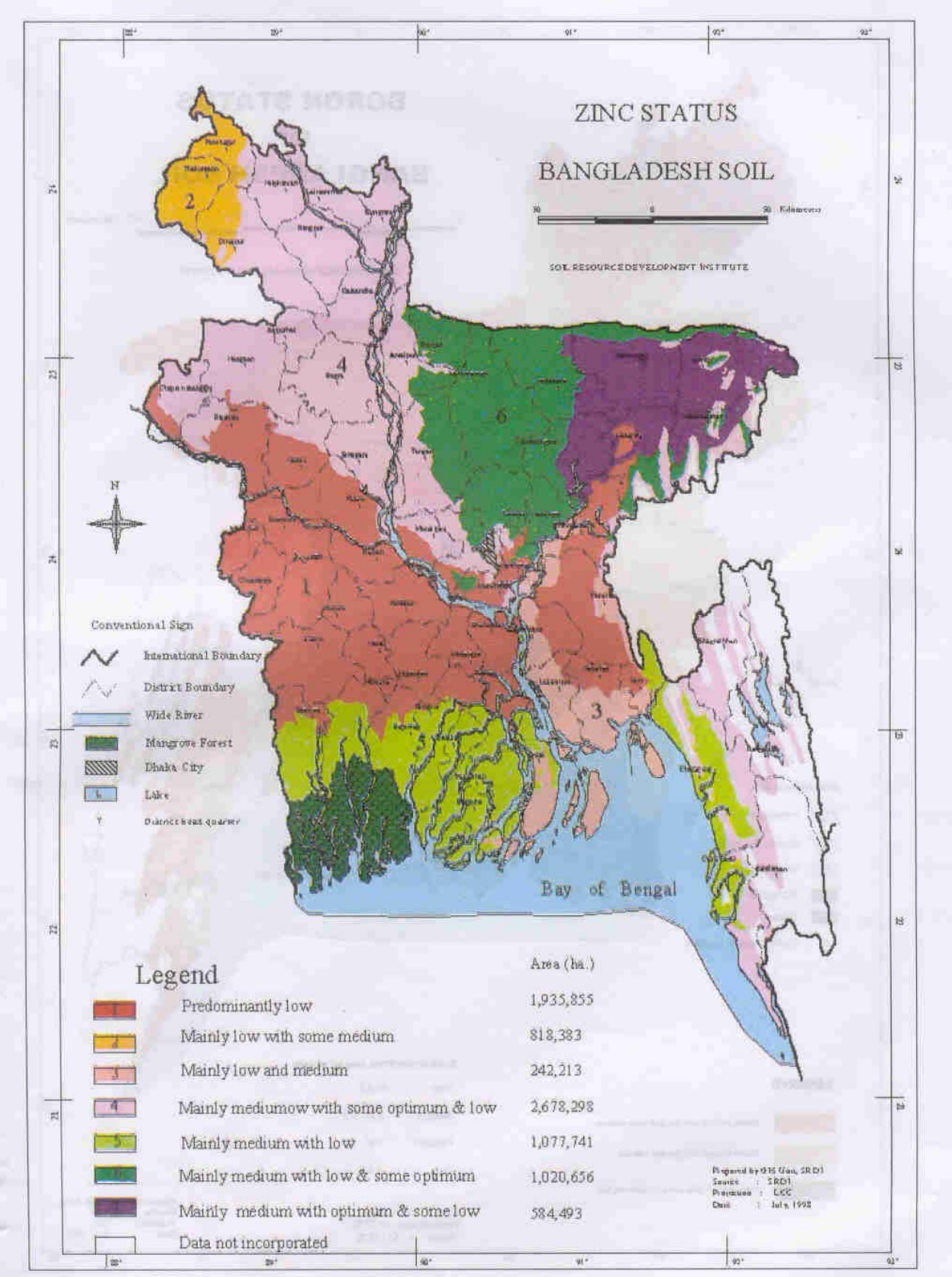

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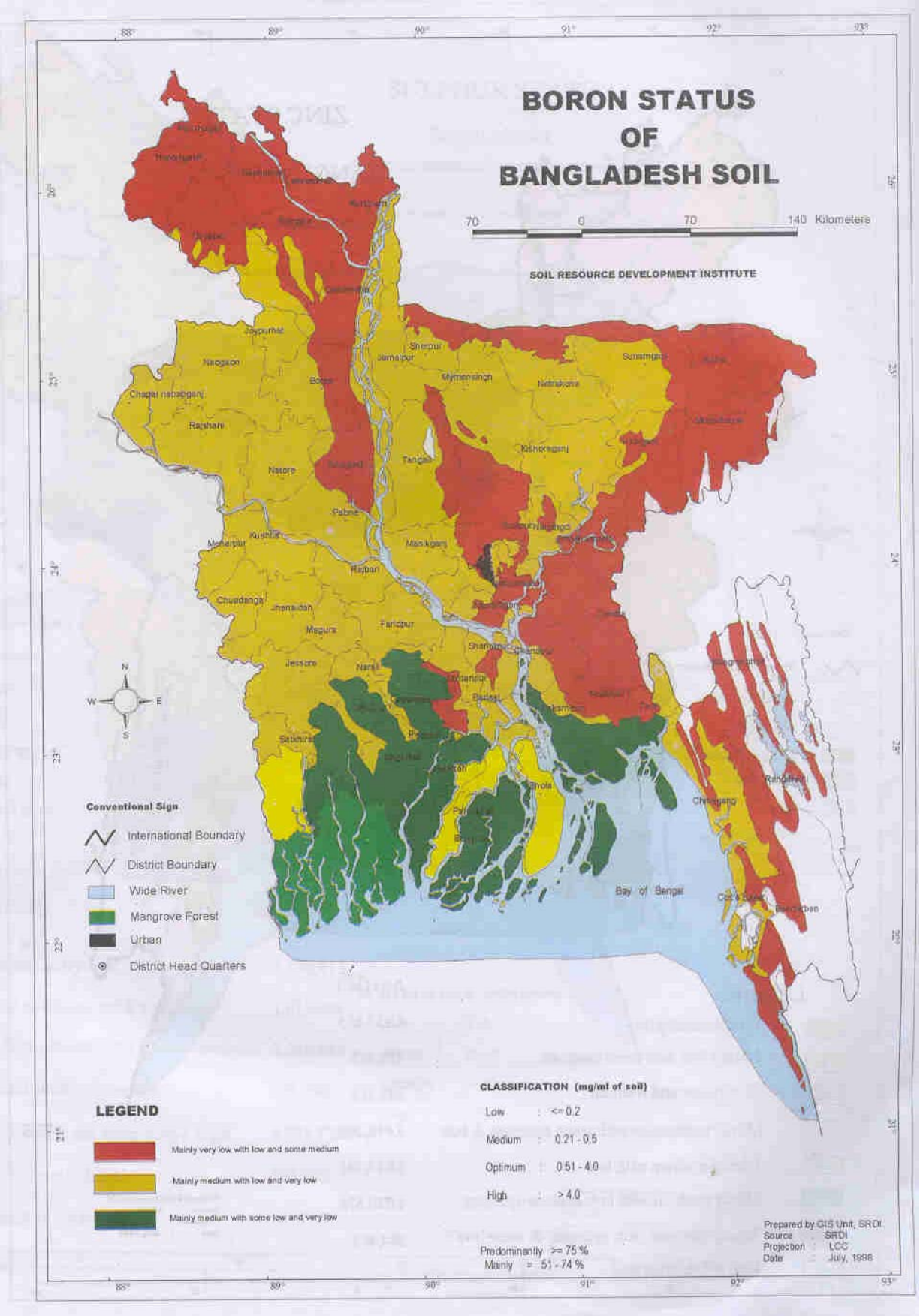

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