## 11th Conference

# Bangladesh Society of Agronomy

## Advances in Agronomic Research under Changing Environment in Bangladesh

# ABSTRACTS

- *Advances in agronomic research in cereals*
- *Advances in agronomic research in pulses*
- *Advances in agronomic research in oil seeds*
- *Advances in agronomic research in cash crops*

**Date:** Sturday, 6 October 2012

**Venue:** BARI Auditorium
Bangladesh Agriculture Research Institute
Joydebpur, Gazipur

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# Advances in Agronomic Research under Changing Environment in Bangladesh

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| Sl. No. | Name of Author(s) | Institution (s) | Title of paper | Full paper |
|---|---|---|---|---|
| **1.** | M Aminul Haque | Water Resources Planning Organization (WARPO), Ministry of Water Resources, House No. 103, Road No. 1, Banani, Dhaka-1213. Email: maminul05@yahoo.com | Food Security under Groundwater Development in Bangladesh: An Institutional Overview | |
| **2.** | M Ilias Hossain[1], M Israil Hossain[2], Mahesh Gathala[3,] T P Tiwary[4] and M Rafiqul Islam Mandal[5] | [1]Senior Scientific officer (Agronomy), Regional Wheat Research Centre, BARI, Rajshahi, Email: iliasrwrc@gmail.com<br>[2] Principal Scientific Officer (Ag. Engineer), Regional Wheat Research Centre, BARI, Rajshahi<br>[3 & 4] Cropping System Agronomist, CIMMYT Bangladesh<br>[5] Director General, Bangladesh Agricultural Research Institute, Joydebpur, Gazipur | IMPROVING CROPS AND SOIL PRODUCTIVITY UNDER CHANGING CLIMATE THROUGH RESOURCE CONSERVATION TECHNOLOGIES | |
| **3.** | R.A. N-E-Ferdous[1], M.J. Islam[1], N.N. Nahar[2], M. S. Islam[3] and Bikash C. Sarker[1*] | [1]Department of Agricultural Chemistry, [2]Department of Biochemistry and Molecular Biology, Hajee Mohammad Danesh Science and Technology University, Dinajpur 5200, [3]Physiology and Sugar Chemistry Division, Bangladesh Sugarcane Research Institute, Ishurdi 6620, Pabna Bangladesh, *Email: bikash@hstu.ac.bd | INTERACTIVE EFFECTS OF LIMING AND NAPTHELENE ACETIC ACID ON GROWTH, ROOT NODULATION AND SEED YIELD OF SUMMER MUNGBEAN cv. BARIMung-6 | |
| **4.** | Md. Humayun Kabir | Post-Doctoral Research Fellow, Doctor Wazed Research Institute; Begum Rokeya University Rangpur-5400, Bangladesh. E-mail: ssjaigirhat@yahoo.com | Conservation and Characterization of Indigenous Bio-chemical Residues from Endangered Medicinal Plants in Flood-plain of Bangladesh | |
| **5.** | M. A. K. Mian[1], | [1]RARS and [2]PRC, Ishurdi, Pabna 6620 | ASSESSING AGRO- | |

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| | M. R. Islam[1], J. Hossain[1] and M. S. Alam[2] | | CLIMATOLOGICAL MODEL OF SUMMER MUNGBEAN | |
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| **7.** | J. Hossain[1], Yasmin[2], A.K.M.R. Amin[3] and M.A.K. Mian[4] and M.R. Islam[5] | [1&5] Scientific Officer, [4] Senior Scientific Officer, Regional Agricultural Research Station, Ishurdi 6620 and [2&3]SAU, Dhaka 1207 | GROWTH AND YIELD OF SOYBEAN AS INFLUENCED BY NUTRIENT LEVEL AND IRRIGATION TIME | |
| **8.** | M. Sh. Islam[1], F. Amin[1], D. K. Nath[2] and M. A. Saleque[1] | [1]Cropping Systems Agronomist, CSISA-IRRI, Barisal Hub and corresponding author [1]Agricultural Development Officer, CSISA-IRRI, Barisal Hub, [1]Project Coordinator (Adaptive Research and Delivery), CSISA-IRRI, Bangladesh | Farmers' Participatory Site Specific Nutrient Management in Ganges Tidal Floodplain Soil for Boro Rice | |
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| **13.** | M. I. Nazrul[1*] and M. R. Shaheb[2] | On-Farm Research Division Bangladesh Agricultural Research Institute (BARI), Sylhet, Bangladesh [1]Senior Scientific Officer* and [2]Scientific Officer, On-Farm Research Division, Bangladesh Agricultural Research Institute (BARI), Sylhet, Bangladesh *Corresponding authors mobile: +88-01930-872008 and E-mail: mi_nazrul@yahoo.com | SCREENING OF PULSE CROPS FOR FALLOW LAND UTILIZATION IN SYLHET REGION | |
| **14.** | M. I. Nazrul[1*]., M. R. Shaheb[2] J. U. Sarker[3] | [1]Senior Scientific Officer* and [2]Scientific Officer, On-Farm Research Division, On-Farm Research Division, Bangladesh Agricultural Research Institute (BARI), Sylhet, Bangladesh. [3]Chief Scientific Officer, OFRD, BARI, Gazipur. *Corresponding authors mobile: +88-01930-872008 and E-mail: mi_nazrul@yahoo.com | ADAPTIVE TRIAL OF BARI RELEASED AROID VARIETIES IN SURMA KUSHIYARA FLOOD PLAIN SOIL | |
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| **17.** | M.S.A. Khan[1], M.A. Karim[2], M.M. Haque[2], A.J.M.S. Karim[3] and M.A.K. Mian[4] | [1]Agronomy Division, BARI [2]Department of Agronomy, BSMRAU [3]Department of Soil Science, BSMRAU [4]Department of Genetics and Plant Breeding, BSMRAU | SCREENING OF SOYBEAN GENOTYPES FOR SALT TOLERANCE IN HYDROPONICS | |
| **18.** | M.R. Amin[1], M.A.Karim[2], Q. A. Khaliq[2] and M. R. Islam[2] | [1] Senior Scientific Officer, On-Farm Research Division, Bangladesh Agricultural Research Institute, Gazipur-1701; and [2]Department of Agronomy, Bangabandhu Sheikh mujibur Rahman University, Gazipur-1706 | SCREENING OF MUNGBEAN (vIGNA RADIATA) GENOTYPES FOR TOLERANCE TO SOIL FLOODING UNDER FIELD CONDITION | |
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| **21.** | [1]M. R. Shaheb*., [2]A. Nessa and [3]M. A. Hossain | *Scientific Officer, OFRD, BARI, Sylhet-3100, Bangladesh; Principal Scientific Officer and Head, Seed Technology Division, BARI; Chief Scientific Officer and Head, Agronomy Division, BARI, Joydebpur, Gazipur-1701, Bangladesh. Cell phone: +880-1712-213582 *Corresponding author's E-mail: smrayhan_bari@yahoo.com | SEED YIELD AND YIELD CONTRIBUTING COMPONENTS OF WHEAT AS AFFECTED BY SOWING TIME AND VARIETY | |
| **22.** | M. A. Mannan | Department of Agronomy, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur-1706, Bangladesh E - mail: mannanbsmrau@yahoo.com | STUDY THE VARIATION OF SOYBEAN YIELD AND PROTEIN CONTENT TO FOLIAR AND SOIL FERTILIZATION | |

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| **30.** | Md. Mahbubul Islam[1] and A.T.M. Morshed Alam[2] | [1]Chief Scientific Officer & Head, Agronomy Division and [2]Senior Scientific Officer, Crop | AGRONOMIC RESEARCH ADVANCEMENTS OF JUTE CROP IN bANGLADESH-A REVIEW | |
| **31.** | M. A. Zaman[1], M. N. A. Siddquie[2], M. Mahbubur Rahman[3], M. J. Islam[4] and K. H. Alam[5] | [1]Corresponding Author and Scientific Officer, RWRC, BARI, Shyampur, Rajshahi, [2]SSO, [3&4]SO, RWRC, BARI, Shyampur, Rajshahi and [5]SSO, Pulses Research Centre, BARI, Ishurdi, Pabna | EFFECT OF SOWING TIME AND GENOTYPES ON THE YIELD AND YIELD ATTRIBUTES OF WHEAT | |
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| **33.** | Rahman*, P. K. Biswas and M. S. A. Sardar | Dept. of Agronomy, Sher-e-Bangla Agricultural University, Dhaka-1207 | WEED CONTROL AND YIELD OF WHEAT AS AFFECTED BY BRASSICA ALLELOPATHY | |
| **34.** | M.A.A. Mamun, P.K.Biswas, M.Asaduzzaman, S.M.Masum and M.F.Karim | Dept. of Agronomy, Sher-e-Bangla Agricultural University, Dhaka-1207 | ALLELOPATHIC EFFECT OF RICE STRAW AND WATER HYACINTH ON WEED CONTROL AND YIELD OF BORO RICE | |
| **35.** | P. K. Biswas*, Touhiduzzaman and T. S. Roy | Dept. of Agronomy, Sher-e-Bangla Agricultural University, Dhaka-1207 | SCREENING OF RICE VARIETIES RESPONSIVE TO SRI (SYSTEM OF RICE INTENSIFICATION) IN *BORO* SEASON | |
| **36.** | H. M. Naser[1], S. Sultana[2], N. U. Mahmud[2], M. H. Rashid[2], N. C. Shil[1] and S, | 1, Senior Scientific Officer; 2, Scientific Officer; 3, Chief Scientific Officer<br>Soil Science Division, Bangladesh Agricultural Research Institute | HEAVY METAL CONTENT IN SOME SPICES GROWN IN INDUSTRIALLY POLLUTED AND NON-POLLUTED AREAS | |

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| **37.** | M. M. Bazzaz*, Q. A. Khaliq, M. A. Karim, A. J. M. Sirajul Karim and J. U. Ahmed | Wheat Research Sub-station, Bangladesh Agricultural Research Institute, Rajbari, Dinajpur | PHYSIOLOGICAL EVALUATION OF WHEAT GENOTYPES UNDER WATER DEFICIT CONDITION | |
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| **39.** | J.A. Chowdhury[1], M. Abdul Karim[2] and Q. A. Khaliq[2] | [1] Department of Agronomy, Bangladesh Agricultural Research Institute, Gazipur. [2]Depatment of Agronomy, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur | WATER STRESS TOLERANCE OF SOYBEAN | |
| **40.** | M.A. Khaleque, M. A. Hussain and M. H. R. Sheikh and M. J. Hossain | [1]PSO, [2] CSO, Pulses Research Centre, BARI, Ishwardi, Pabna and [3] PSO and [4] SO,Regional Agricultural Research Station, BARI, Ishurdi, Pabna | WEED MANAGEMENT IN BLACKGRAM UNDER BED PLANTING SYSTEM | |
| **41.** | Tabib F.A.I. [1], M.A. Karim [2] and M. M. Haque[2] | [1] Deputy Director, Cotton Development Board, Dhaka Region, Dhaka, [2] Professor, Department of Agronomy, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Salna, Gazipur | EFFECT OF PLANTING PATTERN ON PRODUCTIVITY AND ECONOMICS OF COTTON+MUNGBEAN INTERCROPPING SYSTEM | |
| **42.** | Tabib F.A.I. [3], M.A. Karim [4] and M. M. Haque[2] | [1] Deputy Director, Cotton Development Board, Dhaka Region, Dhaka, [2] Professor, Department of Agronomy, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Salna, Gazipur | COMPETITIVE BEHAVIOR OF COMPONENT CROPS IN COTTON+MUNGBEAN INTERCROPPING SYSTEM UNDER VARYING SOWING DATES OF MUNGBEAN | |

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| **44.** | FERDOUS, H. M., Q. A. KHALIQ and M. A. KARIM | Department of Agronomy, BSMRAU, Gazipur, Bangladesh | EFFECT OF SOWING DATES ON YIELD AND QUALITY OF TROPICAL SUGAR BEET GENOTYPES | |
| **45.** | Siddiqui, M.N.A., Q.A. Khaliq, M.A. Karim and M.M. Haque | Department of Agronomy, BSMRAU, Gazipur, Bangladesh | EFFECT OF APPLIED NITROGEN ON GROWTH, YIELD AND NUTRIENT UPTAKE IN BUSH BEAN GENOTYPES | |
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| **47.** | Siddiqui, M.N.A., Q.A. Khaliq, M.A. Karim and M.M. Haque | Department of Agronomy, BSMRAU, Gazipur, Bangladesh | EFFECT OF APPLIED NITROGEN AND PHOSPHORUS ON GROWTH, YIELD AND NUTRIENT UPTAKE IN BUSH BEAN | |
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| **49.** | M. M. Uddin[1], T.J. Krupnik[2], M. F. Haque[3], M.A. Akter[4], M.Z. Hasan[5] and T.P. Tiwari[6] | [1,2 &6] = Cropping Systems Agronomist and [3,4 &5] = Agricultural Development Officer, CSISA-CIMMYT, Bangladesh | EEFFECTS OF BED PLANTING TECHNIQUE IN MUNGBEAN CULTIVATION | |

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| **51.** | M. Sirajul Islam, M. M. Rashid, A. Kabir and M. R. Karim | BRAC, 75 Mohakhali, Dhaka 1212, Bangladesh<br>Email: sirajul.i@brac.net | PERFORMANCE OF DROUGHT TOLERANT NERICA AND GREEN SUPER RICE GENOTYPES IN DIFFERENT SEASONS AND LOCATIONS OF BANGLADESH | |
| **52.** | Md. Appel Mahmud[1].,Tuhin Suvra Roy[2] and Parimal Kanti Biswas[2] | [1]MS Student and [2]Professor, Department of Agronom, Sher-e-Banglaricultural University, Sher-e-Bangla Nagar, Dhaka-1207, Bangladesh | EFFECT OF DIFFERENT LEVELS OF NITROGEN AND TRANSPLANTING DEPTH ON GROWTH AND YIELD OF BRRI dhan50 | |
| **53.** | Jhuma Srabanti Nipa[1]., Tuhin Suvra Roy[2] and A.K.M.Amin[2] | [1]MS Student and [2]Professor, Department of Agronom, Sher-e-Banglaricultural University, Sher-e-Bangla Nagar, Dhaka-1207, Bangladesh | EFFECT OF LIFTING TIME AND TUBER SIZE ON AMBIENT STORAGE PERFORMANCE OF POTATO DERIVED FROM TRUE POTATO SEED | |
| **54.** | Mohsin Tohin[1]., Tuhin Suvra Roy[2] and Md Fazlul Karim[2] | [1]MS Student and [2]Professor, Department of Agronom, Sher-e-Banglaricultural University, Sher-e-Bangla Nagar, Dhaka-1207, Bangladesh | EFFECT OF TUBER SIZE AND PLANT SPACING ON GROWTH AND YIELD OF SEEDLING TUBER DERIVED FROM TRUE POTATO SEED | |
| **55.** | M. Khairul Islam Rony, M. Harunur Rashid, Shama Nasrin, M. A. Saleque | International Rice Research Institute, Bangladesh Office, House # 9, Road 2/2, Banani, Dhaka-1213 | BORO CULTIVATION IN GHERS WITHOUT PLOUGHING SAVES MONEY | |
| **56.** | Islam, Md. K.[1]; Mondelli, D.[2]; Al Chami, Z.[3]; Mimiola, G.[3]; Dumontet S.[4] | 1 Cotton Research, Training and Seed Multiplication Farm, Sreepur, Gazipur, Bangladesh<br>2 Dip. di Biologia e Chimica Agro-Forestale ed Ambientale, Università di Bari, Bari, Italy<br>3 CIHEAM, Istituto Agronomico Mediterraneo di Bari, Valenzano, Italy<br>4 Dip. di Scienze per l'Ambiente, Università di Napoli "Parthenope", | EVOLUTION OF COMPOST MATURITY iNDEXES IN DIFFERENT ORGANIC WASTES | |

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| **58.** | Md. Abdullahil Baque [1, 2]*, Md. Humayun Kabir Shiragi [3], Kee-Yoeup Paek [1] | [1.] Research Center for the Development of Advanced Horticultural Technology, Chungbuk National University, Cheong-ju 361-763, Republic of Korea<br>[2.] Department of Agronomy, Sher-e-Bangla Agricultural University, Dhaka-1207, Bangladesh<br>[3.] Central Lab., Soil Resources Development Institute (SRDI), Ministry of Agriculture (MoA), Govt. of Bangladesh, Krishi Khamar Sarak, Farm Gate, Dhaka-1215<br>*Corresponding author; E-mail: bellah_77@yahoo.com | $CO_2$-ENRICHED MICROENVIRONMENT INDUCES BIOSYNTHESIS OF ANTHRAQUINONES, PHENOLICS AND FLAVONOIDS IN BIOREACTOR CELL SUSPENSION CULTURES OF *Morinda citrifolia* (l.): THE ROLE OF ANTIOXIDANTS AND ENZYMES | |
| **59.** | M. A. Khan | Jute Research Regional Station, Bangladesh Jute Research Institute, Rangpur | EFFECTS OF SOWING TIME AND VARIETY ON kENAF (*Hibiscus cannabinus* L.) SEED PRODUCTION | |
| **60.** | Shama Nasrin, M. Harunur Rashid, M. Khairul Islam Rony, M. A. Saleque | International Rice Research Institute, Bangladesh Office, House # 9, Road 2/2, Banani, Dhaka-1213 | AGRONOMIC OPTIONS FOR ENHANCING SYSTEM PRODUCTIVITY OF T. AMAN-FALLOW-SESAME CROPPING SEQUENCE IN THE SALINE SOILS | |
| **61.** | M.A.A. Mamun, R. Shultana, and M.A.J. Mridha | Agronomy Division, Bangladesh Rice Research Institute, Gazipur<br>Corresponding author: aamamunbrri@yahoo.com | EFFECT OF TILLER SEPARATION ON NEW AREA COVERAGE AND YIELD OF BORO RICE | |

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| **62.** | Md. Abdul Aziz, Ferdousi Begum, Md. Rafiqul Islam Mondal and Pryanka Roy | Bangladesh Agricultural Research Institute, Gazipur | SCOPE OF GROWING FOUR CROPS IN THE EXISTING RICE BASED CROPPING SYSTEM | |
| **63.** | S. M. Shahriar Parvez*, Qazi Abdul Khaliq and M. Rafiqul Islam | Department of Agronomy, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur-1706 | EFFECTS OF PUDDLING INTENSITY AND NITROGEN ON PRODUCTIVITY OF POST-RICE MUNGBEAN | |
| **64.** | Md. Rafiqul Islam*[1] and Yoshio Inoue[2] | [1]Department of Agronomy Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur & [2]National Institute for Agro Environmental Sciences (NIAES), Tsukuba, Japan | ANALYSIS OF LAND USE CHANGE IN THE COASTAL AREA OF BANGLADESH USING lANDSAT IMAGERY | |
| **65.** | Ferdousi Begum, Abdul Aziz, Pryanka Roy and M.Alam | Bangladesh Agricultural Research Institute, Gazipur | SCREENING OF SOYBEAN VARIETIES / ADVANCED LINES AGAINST SALINITY | |
| **66.** | Ferdousi Begum, Abdul Aziz and Pryanka Roy | Bangladesh Agricultural Research Institute, Gazipur | YIELD AND QUALITY PERFORMANCE OF RAPESEED – MUSTARD GENOTYPES UNDER LATE SOWN CONDITION | |

## Distribution of Abstracts According to sub-theme of the Conference

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| A | *Advances in agronomic research in cereals* | | |
| B | *Advances in agronomic research in pulses* | | |
| C | *Advances in agronomic research in oil seeds* | | |
| D | *Advances in agronomic research in cash crops* | | |

# 1. FOOD SECURITY UNDER GROUNDWATER DEVELOPMENT IN BANGLADESH: AN INSTITUTIONAL OVERVIEW

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Groundwater is the key factor making Bangladesh self sufficient in food production. The government has also identified agriculture and rural development as the topmost priority sector for poverty reduction in Bangladesh. Trends indicate that small farmers are becoming increasingly productive as a result of enhanced access to irrigation through groundwater. About 70% of the total irrigated area is under private sector led "minor irrigation". Rapid and unplanned development of groundwater has already possessed threats to water quality and could severely limit the usefulness and the productive duration of the aquifer. The Government has already developed National Water Policy since 1999, the social views of groundwater lag far behind the formal policy. Apart from these, National Agriculture Policy & New Agricultural Extension Policy emphasized well-planned irrigation water management and water use as integrated environmental support respectively. On the other hand, the principal government agencies (WARPO, BWDB, BADC, DAE, DPHE etc) working in the sector of groundwater and conjunctive water resources development as well as in the field of agricultural development and extension. If the policies and guidelines formulated by the relevant agencies, with regards to groundwater and agricultural practices, are implemented in the area through knowledge sharing, technology transfer, the country will attain food sufficiency and eventually find ways for poverty alleviation.

# 2. IMPROVING CROPS AND SOIL PRODUCTIVITY UNDER CHANGING CLIMATE THROUGH RESOURCE CONSERVATION TECHNOLOGIES

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A 7 years field study was conducted at the Regional Wheat Research Centre, Rajshahi as high temperature and water scarcity area to compare the effects of four tillage/straw management treatments (30% straw retention (SR)+permanent raised bed(PRB), 30% SR +conventional tillage (CT), 0% SR + PRB and 0% SR + CT) and five N levels (0, 40, 80, 100 and 120% of recommend N) in a intensified rice-wheat (RW) systems by adding a third pre-rice crop of mungbean. Permanent

beds with 30% straw retention produced the highest productivity for all three crops. Within each N rate total system productivity was higher with 30% SR on PRB and least in CT with 0% straw retention. At 80% of recommended N rate, mean annual system productivity was 12.5 t/ha for PRB with 30% SR and 10.3 t/ha with CT without straw. The results suggest that N fertilizer rates can be reduced 20% when 30% straw is retained. Water use efficiency improved 25-30% under 30% SR with PRB system for all crops. Soil organic matter (SOM) increased 0.32% with blackish color after seven years under 30% SR on PRB. PRB systems with 30% straw retained produced 44% less emission of $CO_2$ into the atmosphere.

## 3. INTERACTIVE EFFECTS OF LIMING AND NAPTHELENE ACETIC ACID ON GROWTH, ROOT NODULATION AND SEED YIELD OF SUMMER MUNGBEAN cv. BARI Mung-6

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A field experiment was conducted to investigate the interactive effect of liming with foliar spray of naphthalene acetic acid (NAA) on the growth, N-fixing root nodulation and seed yield of summer mungbean cv. BARIMung-6. Five liming levels of lime $T_1$: Control (No lime), $T_2$: 1.0 t, $T_3$: 1.5 t, $T_4$: 2.0 t and $T_5$: 2.5 t $ha^{-1}$ were applied to crop field while Napthelene Acetic Acid (NAA) levels; $H_0$: Control (only water), $H_1$: 50 ppm, $H_2$: 100 ppm and $H_3$:150 ppm were applied thrice at 15, 30 and 45 days after sowing (DAS), respectively. The plant height, number of leaves $plant^{-1}$, leaf area $plant^{-1}$ ($cm^2$), fresh root weight (g), root dry weight $plant^{-1}$ (g), root volume ($cm^3$), number of root nodule $plant^{-1}$ and seed yield (t $ha^{-1}$) were significantly influenced by liming (@1.0 t $ha^{-1}$) along with 100 ppm NAA. Nodule formation for atmospheric N fixation in mungbean roots significantly increased in the roots of lime treated soils. This phenomenon was enhanced by NAA application at 100 ppm in mungbean during growth period. Increased dry root weight, root volume, and root nodule number $plant^{-1}$ had a greater effect on net organic carbon and atmospheric N input in soil resulting in soil health improvement. Therefore, lime 1.0 t $ha^{-1}$ along with foliar application of NAA @ 100 ppm may be beneficial for mungbean growth, root nodulation and seed grain yield. Therefore, lime and plant growth regulator had a positive impact on growth and yield attributing characters of mungbean cv. BARIMung-6 that might help in supplying additional pulse in food channel.

## 4. CONSERVATION AND CHARACTERIZATION OF INDIGENOUS BIO-CHEMICAL RESIDUES FROM ENDANGERED MEDICINAL PLANTS IN FLOOD-PLAIN OF BANGLADESH

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Medicinal plants are the plants having potentialities that can be used for the health care and disease management for the animal and Human beings. Bio-active compounds are residues from plant, microbes or synthetic chemicals that can be used for the suppression or regulation of disease causing microbes. Medicinal plants have historically provided a rich source of structurally diverse, biologically active compounds.

Throughout the Bangladesh, medicinal plants are scattered and their availabilities can be grouped into three regions such as - Hill, Terrace and Flood-plain. Among these regions Flood-plain areas occupied 80% of the country including the north-west part that can be defined by a flat alluvial plane carrying a total length of about 1500 miles. The plain is remarkably even, the slope being less than 12 cm a mile and no part is higher than 100 feet above mean sea level. The river deposit every year an enormous quantity of fertilizing silt and sand.

This region is rich with significant of medicinal plants (40%), which are endangered. Survey data showed these endangered medicinal plants posses' huge potential of medicinal values. That is why the proposed research work is highly significant. Therefore, to address meet the challenge of developing modern biology for the twenty first century, a systematic research at least for welfare of humanity is needed.

# 5. ASSESSING AGRO-CLIMATOLOGICAL MODEL OF SUMMER MUNGBEAN

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The experiment was conducted at the Regional Agricultural Research station, Ishurdi during 2007 to 2012 to assess the agro-climatological effect on summer mungbean. The experiment was conducted in a RCB design with three replications. Three mungbean cv. BARI mung 5, BARI mung 6 and BU mung 4 were sown on 15 March, 25 March and 4 April in each year. Unit plot size was 5m × 4.5m. Seed was sown at 30 cm apart line following continuous seeding technique. The soil of the experimental plot was sandy loam with $P^H$ value of 7.16. Cultural management was done as and when necessary. Average yield of six years was the highest (1306 kg/ha) in BARI mung 6 at 25 March sowing. Developed functional yield model was Y=4645.56 + 2.42 HDDS + 6.37 Rainfall – 106.91 Tem. – 16.45 TDM + 0.33 TSSH – 63.78 RH ($R^2$=0.67). The effect of agro-climate can be explained about 67% by this functional model. The co-efficients indicate the rate of change of yield (Y) due to change of one unit of input variables. The model can be used to predict the yield of summer mungbean at prevailing agro-climatic condition of a particular year or to varify the experimental results.

# 6. EFFECT OF DIFFERENT LEVELS OF IRRIGATION AND SULPHUR FERTILIZER ON THE BULB YIELD OF GARLIC UNDER ZERO TILLAGE MULCHED CULTIVATION

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A field experiment was conducted at the Regional Agricultural Research Station, Ishurdi, Pabna, Bangladesh during rabi season of 2008-2009 and 2009-2010 to find out the performance of garlic under zero tillage mulched cultivation to varying levels of irrigation and optimum dose of sulphur. Five levels of sulphur viz.,0, 15, 30, 45 and 60 kg/ha and five levels of irrigation viz., no irrigation ($I_0$), irrigation at 25 DAE ($I_1$), irrigation at 25 and 50 DAE ($I_2$), irrigation at 50 and 75 DAE ($I_3$) finally irrigation at 25, 50 and 75 DAE ($I_4$) were included in the study. These were laid out in a split plot design following three replications. Results showed that irrigation at 25, 50 and 75 DAE followed by irrigation at 25 and 50 DAE were better to other treatments and they significantly increased bulb yield and its components. Among various levels of sulphur, application of 30 kg S/ha was more effective to enhanced the growth as well as yield attributes of garlic. Significantly higher yield (8.85 t/ha) of garlic was obtained with the treatment combination of irrigation at 25, 50 and 75 DAE + 30 kg S/ha. Yield response to sulphur was observed to be quadratic in nature, and indicated that maximum yield (6.77 t/ha) could be obtained by the estimated optimum doses of 36.00 kg S/ha along with the blanked dose of 155-35-125 kg N-P-K/ha and further application of the nutrients over the optimum level would reduce bulb yield.

# 7. GROWTH AND YIELD OF SOYBEAN AS INFLUENCED BY NUTRIENT LEVEL AND IRRIGATION TIME

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A field experiment was conducted at Agronomy Field of Sher-e-Bangla Agricultural University, Dhaka during 2007-08 to evaluate the effect of nutrient level and irrigation time on the growth and yield of soybean. The experiment was laid out in a split-plot design with three replications. The treatments were three nutrient levels viz., recommended dose (RD=28- 35-60-20 kg $ha^{-1}$ of N-P-K-S) ($N_1$), half of RD ($N_2$), double of RD ($N_3$) ; and three times of irrigation like irrigation at flowering stage ($I_1$), irrigation at pod development stage ($I_2$) and irrigation at flowering + pod development stage ($I_3$). Recommended dose showed the highest crop growth rate (CGR) (3.99 g $m^{-2}$ $day^{-1}$) and produced the highest seed yield (1887.97 kg $ha^{-1}$). The highest CGR (4.08 g $m^{-2}$ $day^{-1}$) and seed yield (1934.77 kg $ha^{-1}$) was obtained from irrigation at

flowering + pod development stage. In interaction, the highest crop growth rate (4.44 g $m^{-2}$ $day^{-1}$) and seed yield (2126.33 kg $ha^{-1}$) were observed from recommended dose with irrigation at flowering + pod development stage. This interaction treatment also gave the highest gross return (Tk. 76143.13 $ha^{-1}$) and gross margin (Tk. 43003.13 $ha^{-1}$).

# 8. Farmers' Participatory Site Specific Nutrient Management in Ganges Tidal Floodplain Soil for Boro Rice

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Participatory Site Specific Nutrient Management (SSNM) trials were conducted at Gajalia in Babugonj Upazila under Barisal district during Boro season 2012. Four treatments (NPK, PK (-N), NK (-P), and NP (-K)) were imposed to observe the response of nutrient elements on yield of BRRI dhan29 in 10 farmers' plot. The experimental design was RCBD with disperse replication while each farmer was considered as replication. The initial soil of farmers' plot was analyzed. Out of 10, 9 farmers' plots were P deficient. The highest grain yield (6.01 t/ha) was observed in NPK treatment plot while the lowest grain yield (3.45 t/ha) was found in N omission plot. The grain yield in -P and -K treated plots were 4.29 t/ha and 5.46 t/ha. The NPK treatment plot gave 74.20%, 40.09% and10.07% higher yield than -N, -P and -K, respectively. The calculated doses of N, P and K were 115.2, 7.17 and 13.75 kg/ha, respectively. It could save 16.50% N, 60.04% P and 73.75% K in compare with recommended dose. Thus farmers can save total Tk. 3,257 per hectare rice production cost. From these results, it can be concluded that N and P are the most yield limiting factors in that location.
**Key words:** Grain yield, Nutrient omission, NPK, SSNM.

# 9. Integrated Soil and Nutrient Management to Improve the Productivity of Wheat-Maize- Rice Cropping System

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A field experiment was initiated at the central research farm of Bangladesh Agricultural Research Institute, Gazipur in November 2009 to study the combine effect of soil and nutrient management to achieve improve and sustainable productivity in wheat-maize-rice cropping system. Four levels of nutrient management (control, recommended fertilizers, IPNS based fertilizers and recommended fertilizers plus 5 t $ha^{-1}$ cow dung) were tested under four levels of soil management (bed planting, bed with straw mulch, conventional tillage and conventional with straw mulch) in split plot design starting with wheat crop sown on 20$^{th}$ November 2009. Yield and yield contributing characters of component crops in the system were measured following standard methods. To understand the treatment effect on crops some additional studies including soil moisture content, weed growth, growth analysis of roots were made duly.

Also the chemical analysis of soils were carried out following standard methods to determine the nutrient contents in soil after each cropping cycle upon rice harvest. The result indicated that soil management treatments had significant effect on surface soil moisture content that contributed to stand establishment both for wheat and maize crop. Application of rice straw as mulch in bed or flat soil conditions was equally effective in conserving initial soil moisture, enhancing wheat root development and reducing weed growth and thereby positively influenced number of spikes/$m^2$ of wheat and cobs/$m^2$ of maize which ultimately contributed to yields of wheat and maize crops. However, neither nutrient management nor soil management levels alone could produce the maximum yield but the combination of recommended fertilizers with 5 t/ha cow-dung couple with rice straw mulch application in flat or bed resulted in maximum yield of wheat and maize. Rice yield was the maximum under nutrient level of IPNS and was not further increased due to further increase in nutrient levels of recommended fertilizers plus 5 t/ha cow-dung. Also the different soil management treatments imposed in previous crops had the similar residual effect on rice yield.

## 10. EFFECTS OF SEEDLINGS PER HILL AND PLANT SPACING ON YIELD AND YIELD CONTRIBUTING CHARACTERS OF SUBMERGED TOLERANT RICE VARIETIES

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A field experiment was conducted at the Bangladesh Agricultural University Farm during the Boro season 2011 to determine the effect of number of seedlings $hill^{-1}$ and plant spacing on yield and yield characters of two submerged tolerant rice varieties. The soil of the experimental area was silt loam in texture, pH 6.9, organic matter 1.77%, available P 17.3 ppm, exchangeable K 0.13 meq/100 g soil and available S 12.0 ppm. Forty day old seedlings were transplanted in the field on 10 August 2011. The number of seedlings $hill^{-1}$ was 2 and 4; the plant spacings were 15 cm x 15 cm, 15 cm x 20 cm and 20 cm x 20 cm and the varieties tested were BRRI dhan51 and BRRI dhan52. The experiment was conducted following the split-plot design with number of seedlings $hill^{-1}$ in the main plot, plant spacing in the sub-plot and rice variety in the sub-sub plot. The rate of fertilizers used were 75 kg N, 14 kg P, 48 kg K, 10 kg S and 3 kg Zn $ha^{-1}$ from urea, TSP, MoP, gypsum and zinc oxide, respectively. The whole amount of P, K, S and Zn fertilizers was applied one day before transplantation. Nitrogen fertilizer was top dressed in two equal splits, one at maximum tillering and the second at panicle initiation. Plants were subjected to complete submergence with water depth of 0.9 m after 10 days of transplanting. After 15 days of submergence, the water was drained out from the field. Additional 20 kg N $ha^{-1}$ was applied after 7 days of desubmergence. The crop was harvested at full maturity and the yield and yield contributing characters were recorded. The number of seedlings $hill^{-1}$ had no significant effect on plant height, panicle length, grain and straw yields of the varieties. However, wider spacing significantly increased the number of fertile tillers $hill^{-1}$ and grains $panicle^{-1}$ while the other parameters remained statistically insignificant. The variety BRRI dhan52 produced significantly taller plants, higher number of

grains panicle$^{-1}$ and grain yield compared to BRRI dhan51. On the other hand, BRRI dhan51 had significantly higher effective tillers hill$^{-1}$ compared to that found in BRRI dhan52. There was no significant effect of seedling hill$^{-1}$ and plant spacing on yield and yield contributing characters of the varieties. Similarly, the interaction effect of seedlings hill$^{-1}$ and varieties on yield and yield parameters were also non-significant. The interaction effect of spacing and variety was significant on only tillers hill$^{-1}$. The interaction effect of seedlings hill$^{-1}$, plant spacing and variety was significant on grains panicle$^{-1}$. It appears from the study that 4 seedlings hill$^{-1}$ coupled with 20 cm x 20 cm spacing produced higher grain yield of BRRI dhan51 and BRRI dhan52 rice varieties.

## 11. SCREENING OF MUSTARD VARIETIES FOR FALLOW LAND UTILIZATION IN SYLHET REGION

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An observation trial was conducted at two locations of Farming system research and development site (FSRD), Jalalpur, South Surma and Multi-location testing (MLT) site, Zakigonj, Sylhet during rabi season of 2010-2012 to select suitable variety of mustard crop for Sylhet region of Bangladesh and to increase oil seed production as well as income of farmers. There were seven varieties of mustard namely: BARI Sarisha 9, BARI Sarisha 11, BARI Sarisha 13, BARI Sarisha 14, BARI Sarisha 15, BARI Sarisha 16 and BINA Sarisha 7 were used for this experiment. The experiment was laid out in randomized complete block design with three dispersed replications in both locations. The results revealed that BARI Sarisha 11 performed better in both locations than that of the others, followed by BARI Sarisha 16. The lowest grain yield was recorded in BINA Sarisha 7. Therefore, it might be concluded that BARI Sarisha 11 and BARI Sarisha 16 could be the best for that area in respect of yield.

## 12. FEASIBILITY OF THE LATE PLANTING POTENTIAL OF TOMATO VARIETIES DURING THE RABI SEASON IN SYLHET REGION

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A long term experiment was carried out at farmers' field of Sylhet region during rabi season of 2009-2012 to find out the suitable tomato variety for late rabi season when the demand and

price of tomato are high in the market. The experiment was laid out in randomized complete block design with three dispersed replications. There were two sets of treatments comprising: a) three tomato varieties (BARI tomato 8, BARI tomato 9 and BARI Tomato 14) and b) for dates of planting of tomato seedling (01 December, 15 December, 01 January and 15 January). Results revealed that dates of planting and variety influenced significantly the fruit yield and yield contributing characters of tomato. The main effect results showed that BARI Tomato 8 produced the highest yield than that of other varieties. Irrespective of variety, seedling of tomato planted at 01 December is the suitable time for getting the highest tomato yield. The interaction results indicated that the highest yield was obtained from BARI Tomato 8 planted at 01 December followed by BARI Tomato 14 planted at 15 December. The lowest yield was recorded from BARI Tomato14 planted at 15 January.

## 13. SCREENING OF PULSE CROPS FOR FALLOW LAND UTILIZATION IN SYLHET REGION

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Experiments were carried out at Farming System Research and Development site (FSRD), Jalalpur, Sylhet and Multi-Location Testing (MLT) Sites, Zakigonj and Sunamgong during 2010-12 to find out the suitable chickpea, lentil and mungbean varieties for Sylhet region. For chick pea, nine varieties viz: BARI Chola 3, BARI Chola 4, BARI Chola 5, BARI Chola 6, BARI Chola 7, BARI Chola 8, BINA Chola 4, BINA Chola 5 and BINA Chola; for lentil, four varieties viz: BARI Mosur 3, BARI Mosur 4, BARI Mosur 5 and BARI Mosur 6 and for mungbean, nine varieties i.e. BARI Mung 2, BARI Mung 3, BARI Mung 4, BARI Mung 5, and BARI Mung 6 and BINA Mung 5, 6, 7 and 8 were used in these study. Experiments were laid out in RCB design with three replications in all locations. Results pertaining to the yield and yield contributing characters were influenced significantly among the varieties. Results reveled that BARI Chola 5 gave the highest yield followed by BARI Chola 4 and BARI Chola 3. The lowest yield was produced by variety BINA Chola 6. On the other hand, BARI Mosur 6 performed better than that of the others, followed by BARI Mosur 5. On contrary, results from the screening of mungbean varieties found that the highest yield of Mungbean was obtained from the variety BARI Mung 6 followed by BINA Mung 8 and 6 while the lowest yield was recorded in BARI Mung 2. Thus, it might be concluded that BARI Chola 5, BARI lentil 6 and BARI Mung 6 could be the best option for increasing the growing area and utilizing fallow land during rabi season in Syleht region.

## 14. ADAPTIVE TRIAL OF BARI RELEASED AROID VARIETIES IN SURMA KUSHIYARA FLOOD PLAIN SOIL

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Aroid (Panikachu) is one of the most important tuber crops commercially grown in all parts of the country. The crop has good potential for production in the wet season and can survive a certain period in floodwater. It supplies sufficient amount of Fe, Mg etc. A field trial was carried out in the farmer's field of Sylhet region during the two consecutive years of 2010-11 and 2011-12 to evaluate the performance of the BARI released aroid varieties as to popularize, disseminate as well as increasing productivity at farmer's level. Four varieties of aroids viz. BARI Panikacu 1, BARI Panikachu 2, BARI Panikachu 3 and local variety (Mura kachu) were tested in this study. The experiment was laid out in randomized complete block design in six farmer's field (considering as six dispersed replications). The results revealed that the yield and yield attributes of aroid varied by different varieties. BARI Panikachu 1 produced higher number of stolons per plant followed by BARI Panikachu 2 while the local variety of panikochu (mura kochu) provided the lowest number of stolon per plant. The highest yield of stolon was recorded in BARI Panikachu 1. This was followed by BARI Panikachu 2 and the local variety panikachu (mura kochu) produced the lowest stolon yield. Therefore, to increase the production as well as income of farmers, BARI Panikachu 1 could be a good option in Sylhet region.

## 15. Morphological, Physiological and Biochemical Characterization of Seeds of French Bean (Phaseolus vulgaris) Genotypes

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The present study was conducted to characterize the seeds of ten yield promising French bean genotypes based on physical, physiological and chemical tests at the Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU, Gazipur in 2011. The genotypes were characterized into six categories based on their seed coat colour, such as white, dark brown, reddish brown, pale brown marked with ash stripe, brown and reddish brown mottled. The seeds of different genotypes were in different size and shape. The genotypes BB-3, BB-9, BB-10, BB-11, BB-15 and BB-18 were characterized as of oval shape. BB-16 was more or less square shape, while BB-6, BB-19, and BB-25 were cylindrical. The longest seed was found in BB-25 (12.09 mm) while the shortest one was BB-3 (6.09 mm). The maximum breadth was recorded in genotype BB-18 (6.81 mm) which was followed by BB-10 and BB-25, while the minimum breadth was found in BB-3 (3.31mm). The highest average 100-seed weight was found in BB-10 (32.03 g), which was followed by BB-18 and BB-25. The minimum 100-seed weight was found in BB-3 (11.40 g). The longest seedling root was recorded in BB-19 which

was followed by BB-10, BB-18, and BB-3. The longest shoot was recorded in BB-3 which was followed by BB-11, BB-9, and BB-15.The seedling length was significantly higher in BB-3 which was followed by BB-11 and BB-19. The germination (%) of the 10 French bean genotypes ranged from 82.50% to 95.00%. The maximum germination (95.00%) was observed in both BB-15 and BB-16, whereas the minimum germination 82.50% was in BB-19. Vigour index of seed samples ranged from 21.35 to 24.67. The highest vigour index was observed in BB-3. The lowest vigour index was observed in BB-19. Electrical conductivity of leachetes showed significant differences among the genotypes. Genotype BB-19 showed maximum EC (1.020mS/cm) followed by BB-10, whereas the lowest EC was found in BB-16 (0.499mS/cm). In case of seed viability, the genotype BB-16 exhibited the maximum viability followed by BB-25, BB-6, and BB-15 and.BB-3. Conversely, least viability was observed in BB-19 which was followed by BB-10 and BB-11. Protein content ranged from 18.95 % to 28.41 %, where BB-18 had the highest and BB-6 had the lowest percentage of protein. Moisture content of seed samples ranged from 9.91% to12.06%. The highest moisture content was observed in BB-6 (12.06%), while the lowest was in BB-10 (9.91%). Varied response of French bean genotypes to sodium hydroxide test was observed. Based on the colour development, the genotypes were grouped into brown, reddish brown and light reddish brown. Out of ten genotypes, BB-6 and BB-18 developed reddish brown while BB-9, BB-10 and BB-16 developed light reddish brown color. BB-11, BB-19 and BB-25 developed brown color when no color was found in BB-3 and BB-15.The genotypes also exhibited varied response to potassium hydroxide test. Based on the color development, the genotypes were grouped into five groups viz., brown, radish brown, light brown, deep brown and yellowish brown. Genotypes BB-6 and BB-18 developed brown color, while BB-9 and BB-19 developed deep brown color. BB-11 and BB-16 developed yellowish brown color when no color was found in BB-3 and BB-15. The two genotypes, BB-10 and BB-25, developed light brown and reddish brown colors respectively.

## 16. GENOTYPIC VARIABILITY IN SEED DORMANCY AND SEED QUALITY OF SOYBEAN

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Soybean seeds in general have little dormancy due to its high oil content, though other characters of seed quality vary among genotypes. It is likely that genotypic variations in seed dormancy also exist to some extent. To analyze the genotypic variations in seed dormancy and quality, ninety five soybean genotypes were tested at the Seed Science and Technology Unit laboratory of Bangabandhu Sheikh Mujibur Rahman Agricultural University during January to April 2010. Seed size (100-seed weight) of the genotypes was recorded beforehand to relate the size and seed quality. The size varied from 6 to 34 g; number of small seed genotypes were 15 (6-10g), medium were 64 (10-18g) and large 15 (18-26g), while one genotype G00149 had very large seeds of 30-34g. Different parameters of seed quality varied among the genotypes. Germination varied from 55 to 100 %. The lowest germination (%) was found in 2 genotypes, which were G00352 and G00379. The intermediate level of germination percentage (70-90%) was found in 19 genotypes, while the highest number of genotypes (74) showed the maximum germination (90 to 100%). Percent of non-germinated seeds varied from 0 to 45% among the

genotypes. Most of the genotypes (70) had 0 to 5% non-germinated seeds, 13 genotypes showed 5 to 15%, only 3 genotypes showed 15 to 30% and one genotype G00379 had 40 to 45% non-germinated seeds. Genotypes G00346, G00388, G00352, G00024, G00317 and G00379 had 20 to 45% non germinated seeds. The seed coat thickness of soybean genotypes varied from 0.05 to 0.15 mm. The thin seed coat was observed in 21 (0.05-0.07mm) genotypes, while the thickest seed coat was found in 4 (0.12-0.15mm) genotypes, namely G00317, G00252, G00318 and G00346. There was a genotypic variation in imbibitions pattern of soybean seeds. After 6 hours of seed immersion, imbibitions varied from 30 to 130 %, and after 12 hours of immersion the imbibitions varied from 60 to 150 %. Most of the genotypes (59) imbibed by 90 to 110 % after 6 h and 64 genotypes imbibed by 110 to 130% after 12h interval. Imbibition was less than 90 % in seeds of 33 genotypes after 6 h and in 7 genotypes after 12 h. The electrical conductivity (EC) of imbibed seeds varied from nearly 40 to 280 $\mu$S $cm^{-1}g^{-1}$. Based on the EC the genotypes were categorized into five groups such as (i) a very low conductivity group having less than 60 $\mu$S $cm^{-1}g^{-1}$, (ii) low conductivity group with 60 to 120 $\mu$S $cm^{-1}g^{-1}$, (iii) medium conductivity group with 120 to180 $\mu$S $cm^{-1}g^{-1}$ (iv) high conductivity group with 180 to 200 $\mu$S $cm^{-1}g^{-1}$ and (v) very high conductivity group with more than 200 $\mu$S $cm^{-1}g^{-1}$. The genotypes with very low conductivity group with less than 60 $\mu$S $cm^{-1}g^{-1}$ were G00346, G00035, G00388, G00318, and G00354. Different soybean genotype showed different degree of dormancy. Dormancy of genotypes ranges from 0 to 45 %. The highest dormancy percentage (35-45 %) was found in 2 genotypes which were G00352 and G00379.

## 17. SCREENING OF SOYBEAN GENOTYPES FOR SALT TOLERANCE IN HYDROPONICS

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Salt tolerance of 41 soybean genotypes was evaluated out at the Banghabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Salna, Gazipur in a non-circulating hydroponic system with supplemented nutrients solution. The salinity levels of the solutions were 0, 100 and 150 mM NaCl. Leaf area was the most sensitive character to NaCl salinity, while plant height, root volume and leaf SPAD value were least affected. Similarly, shoot dry weight (32.30% to control) was more sensitive to salinity than the root dry weight (34.91% to control), especially at 150mM NaCl salinity. Seven genotypes were found salt tolerant which produced more than 80% shoot dry weight and 21 genotypes were moderately tolerant for their 60 to 80% relative shoot dry weight at 100mM NaCl salinity. None of the genotypes could produce more than 80% shoot dry weight at 150 mM NaCl salinity. Genotypes Galarsum, G00331, BD2342, G00041, Shohag, AGS313, G00028, BD2330, BD 2331, G00073, G00152, G00209 and PK 416 showed relatively lower salinity susceptibility index (SSI) than others.

## 18. SCREENING OF MUNGBEAN (vIGNA RADIATA) GENOTYPES FOR TOLERANCE TO SOIL FLOODING UNDER FIELD CONDITION

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Forty mungbean genotypes were screened for their flooding tolerance in the field of Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur, Bangladesh during April to June, 2010. The screening criterion of the genotypes was based on survivability % after removal of the flooding stress. The flooding was imposed at 22 days after emergence (DAE) maintaining 3-5 cm water for 7 days. Their survival % and growth rate were recorded on the 8$^{th}$ day (28 DAE), 18$^{th}$ day (38 DAE) and 28$^{th}$ day (48 DAE) after removal of flooding. The 7-day flooding severely damaged the plant survivability. Only 4 genotypes namely, CO-3, VC-6173A, VC- 3160(A-89) and BU mug-2 showed 30-34% survivability, 11 genotypes showed in the range of 20-29% and the rest 25 genotypes had survivability of <20%.

## 19. EFFECT OF DURATION OF SOIL FLOODING ON GROWTH PERFORMANCE OF SOME SELECTED MUNGBEAN (*Vigna radiata*) GENOTYPES

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Growth performance of 10 selected mungbean genotypes, viz. GK-7, GK-48, GK-65, VC-6173A, CO-3, IPSA-12, IPSA-13, IPSA-15, BARImug-5 and BUmug-2 were conducted under flooding conditions in the field of Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur, Bangladesh during April to July 2011. The 10 genotypes were selected, out of 40, based on their survivability % to 7 days flooding conditions at the pre-flowering stage. The soil flooding was created by maintaining 3-5 cm standing water at 22 DAE for 2, 4 and 6 days. Flooding delayed days to flowering and maturity by 1-7 days, and the longer the duration of flooding, the longer the time was required for the flowering and maturity. Yield and yield contributing characters of the genotypes were greatly affected by the flooding and the longer the duration of flooding, the higher was the reduction of the characters. Four genotypes viz., IPSA 13, VC-6173A, BU mung-2 and BARI Mung-5 produced relatively higher grain yield than the other 6 genotypes.

## 20. EVALUATION OF RICE GENOTYPES FOR THEIR TOLERANCE TO SALINITY

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Two experiments was conducted, one at laboratory and another at the vinyl-house of Agronomy Department, Bangabandhu Sheikh Mujibur Rahman Agricultural University,

Gazipur from March -December, 2010 to evaluate the rice (*Oryza sativa* L.) genotypes for their tolerance to salinity. In the first experiment one hundred genotypes and two check cultivars (Pokkali as tolerant and IR29 as susceptible) were exposed to salt solution of electrical conductivity (EC) of 10, 15, and 20 $dSm^{-1}$ (5:1 molar concentration of NaCl and $CaCl_2$ solution) at germination and early seedling stage. Based on the visual salt injury symptoms at 15 $dSm^{-1}$, 13 genotypes were found fairly tolerant to salinity. However, among the 13 genotypes, only Patnai23 showed higher germination index (92.7) and relative seedling dry weight (90.88) than the check salt tolerant Pokkali (89.60 & 88.08%) at 15 $dSm^{-1}$. Performance of Awned-1, Nonasail and Soloi was also well at this level. The genotypes Patnai23, Awned-1, Nonasail and Soloi showed the best performance under saline condition. Based on the first experiment relatively salt-tolerant eleven genotypes were used in the second experiment. Among the eleven genotypes, finally three genotypes (Patnai 23, Chapali and Soloi) were considered as moderately salt tolerant, on the basis of their yield and yield contributing characteristics, such as plant height reduction , total tiller reduction , effective tiller reduction , reduction of fertile grain per panicle, grain yield and relative grain yield.

## 21. SEED YIELD AND YIELD CONTRIBUTING COMPONENTS OF WHEAT AS AFFECTED BY SOWING TIME AND VARIETY

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A two years field study was carried out in the research field of Seed Technology Division, Bangladesh Agricultural Research Institute, Gazipur, Bangladesh during *rabi* season of 2008-10. The aim of this study was to study the effect of three sowing dates (20 Nov, 05 Dec and 20 Dec) and three varieties (Bijoy, Sufi and Prodip) on the seed yield and yield contributing components of wheat. The experiment was laid out in a split plot design with three replications assigning seeding date in main plot and variety in subplots. Results revealed that there were significant variations observed among seeding time of wheat except plant population $m^{-2}$, spikes $m^{-2}$, plant height and biomass yield. Results showed that the highest seed yield of 3.27 and 3.71 $tha^{-1}$ were recoded from 20 November sowing in the year 2008-09 and 2009-10, while the lowest seed yield (2.96 $tha^{-1}$) was found on 20 December date of seeding of wheat both the year, respectively. Irrespective of sowing dates, variety Sufi significantly produced the highest seed yield of 3.02 and 3.64$tha^{-1}$ in the year 2008-09 and 2009-10, respectively. The interaction effect of seeding date and variety showed that all the parameters except plant population $m^{-2}$, $spikesm^{-2}$, plant height and biomass yield were significantly influenced. The highest seed yield of 3.33 and 3.74$tha^{-1}$ were recoded from 15 November sowing along with Sufi variety in the year 2008-09 and 2009-10, respectively. Increased number of tiller $plant^{-1}$ and more dry matter accumulation for 20 November seeding due to lower temperature with higher grain growth might be responsible for increased seed yield of wheat.

# 22. STUDY THE VARIATION OF SOYBEAN YIELD AND PROTEIN CONTENT TO FOLIAR AND SOIL FERTILIZATION

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A field experiment was carried out at Agronomy Farm of Patuakhali Science and Technology University, Dumki, Patuakhali, from December 2011 to February 2012, in order to study the effects of nutrient foliar spray on soybean growth, yield and protein content. Shohag, soybean variety was used in the experiment; nutrients were foliarly applied as exclusively N, NPK and NPKMg at vegetative and pod filling stages. Soil fertilizations were done as recommended dose and no soil and foliar fertilization in control plot. Plants were sprayed at the rate of 100 mg/L of water corresponding to each nutrient. The experimental design was a split plot with three replications. Result from the experiment showed that nutrient foliar spray, either singly or in combination, enhanced the growth and yield of the soybean as well as protein content in soybean seed, at the two growth stages compared to soil fertilization. However, spraying nutrients during pod filling stage was better than vegetative spraying stage in all characters studied. The highest amount of protein content in soybean seed and grain yield per plant were obtained by spraying NPKMg.

# 23. SEEDLING AGE EFFECTS ON GROWTH CHARACTERISTICS, PRODUCTIVITY AND SEED QUALITY OF LONG GRAIN RICE

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Field experiment was carried out at the experimental farm of Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur, during kharif II season of 2010 to standardize seedling age of the rice variety BUdhan 1 for better seed yield and quality. Eight seedling age *viz*. 10, 20, 30, 40, 50, 60, 70 and 80 days old constituted the treatment variables. Seedling age significantly influenced on phenological events of the variety while days required for expressing phenological events *viz.* days to first flowering, 50% flowering and maturity decreased with the increase of seedling age. The tallest plant (119.89 cm) was obtained from 10 days old seedlings and the shortest (108.37 cm) from 80 days old seedlings. The 10 days old seedlings also produced the highest (13.0) number of tillers per hill. However, the highest (10.07) number of panicle bearing tillers per hill, filled grains per panicle (119.1) and yield (4.53 t $ha^{-1}$) were recorded from rice plant transplanted by 30 days old seedlings. Physical and physiological seed quality decreased in the seeds produced by older seedlings. The seeds produced by transplanting of 30 days old seedlings showed significantly higher germination and other vigor index values. Therefore, it is desirable to collect seeds from younger seedlings (30 days old) transplanted rice to ensure higher seed yield with better seed quality of newly developed (BUdhan 1) Aman rice variety.

# 24. PHENOLOGY, YIELD AND SEED QUALITY OF RICE AS INFLUENCED BY PLANTING DATES IN LATE AMAN SEASON

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Field experiment was conducted at the Bangabandhu Sheikh Mujibur Rahman Agricultural University during rainy season of 2008 to determine suitable planting time of newly developed advanced line of Aman rice under late planting situation. The advanced line 9625-15-21-58-87-165 was developed by crossing KK4 and Kataribhog and planted on five dates viz. 15 August, 1 September, 15 September, 1 October, and 15 October. Results showed that the line planted at earlier dates required more time to flowering and maturity than the later dates. Similarly, growth of the crop was profound at earlier plantings where tallest plant (95 cm) was observed at 15 August planting and it decreased gradually to 57cm at 15 October planting. The highest grain yield (3.79 t $ha^{-1}$) of the line was found from 1 September planting which was statistically identical to the yield obtained from 15 August planting. The yield of the line decreased under further delayed of planting and it was only 0.21 t $ha^{-1}$ at 1 October planting. Better quality seed in terms of viability, germination, germination index, mean germination time and seedling vigor was observed in the seeds harvested from 15 August, 1 September and 15 September plantings. Results of seed health also revealed better health in the seeds of those plantings which suggested that planting should not delayed beyoned 15 September for better yield and seed quality of the advanced Aman rice line.

# 25. INFLUENCE OF MONOPODIA REMOVAL, PLANT SPACING AND NUTRIENT APPLICATION ON YIELD AND QUALITY OF COTTON LINT

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Two field experiments were conducted in two successive years at the Cotton Research Farm, Gazipur, Bangladesh to evaluate the influence of monopodia removal, plant spacing and application of NPK on growth, yield and lint quality of cotton. In the first experiment, cotton was planted in plant spacing of (i) 90 cm × 45 cm, (ii) 80 cm × 45 cm, (iii) 70 cm × 45 cm and (iv) 60 cm × 45 cm while monopodia was removed (i) continuous, (ii) at flowering stage and (iii) unremoval control. The removal of monopods either continuous or at flowering stage did not affect morphology and phenology of cotton. Cotton plants with monopodia removal at flowering stage in closer plant spacing (60 cm × 45 cm) intercepted more light, produced more dry matter and maintained better crop growth rate throughout the growing season. Monopodia removal in flowering stage at closer spacing produced the highest seed cotton yield (2.41 t $ha^{-1}$) and lint yield (0.84 t $ha^{-1}$) without affecting the ginning properties of cotton fibre. In the second

experiment, optimization of NPK requirement of cotton was done under the condition of monopodia removal and closer plant spacing. Fourteen treatment combination viz. 0-36-99, 35-36-99, 70-36-99,105-36-99, 140-36-99, 105-0-99, 105-12-99, 105-24-99, 105-48-99, 105-36-0, 105-36-33, 105-36-66 and 105-36-132 kg NPK $ha^{-1}$ were used in the experiment. The application of 140-36-99 kg NPK $ha^{-1}$ favoured better canopy development with the highest (13.80 g $m^{-2}$ $day^{-1}$) crop growth rate. This treatment also produced the highest seed cotton yield (2.27 t $ha^{-1}$) and lint yield (0.77 t $ha^{-1}$) and increased the staple length of fibre. Uptake of NPK by cotton increased with the increase of NPK levels although nutrient use efficiency decreased at the higher levels. Economic analysis revealed that application of 140-36-99 kg NPK $ha^{-1}$ is the most profitable as it showed the highest gross margin (Tk. 146602 $ha^{-1}$) and highest benefit cost ratio (4.61). Therefore, application of 140-36-99 kg NPK $ha^{-1}$ under the condition of monopodia removal and closer spacing might be productive and economical for cotton cultivation.

## 26. PERFORMANCE OF DRY DIRECT SEEDED BORO RICE IN FARMER'S FIELD AT FOUR LOCATIONS

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The sustainability of boro rice production in Bangladesh is likely to face major threat due to water shortage. The conventional puddle transplanted boro rice requires huge amount of irrigation water. Therefore, water efficient rice production technology is needed to replace the conventional system for sustaining boro rice production in the country to ensure food security. Two boro rice varieties viz. BRRI dhan29 (Long duration variety, 155-160 days) and BRRI dhan28 (Short duration variety, 134-140 days) were grown in farmers field in three different systems (viz. puddle transplanted conventional irrigated, puddle transplanted alternate wetting and drying irrigated and dry direct seeded) at four locations of Bangladesh (viz. Sundarban in Sadar of Dinajpur, Norkona in Modhupur of Tangail, Narandia in Purbadhala of Netrokona and Bijoynagar in Godagari of Rajshahi) during boro seasons of 2009-10 and 2010-11. The result revealed that the rice yield and economic return for both the varieties were highest in dry direct seeded fields and the lowest in puddle transplanted conventional irrigated fields. The dry direct seeded field and puddle transplanted alternate wetting and drying fields required 6-9 and 11-15 irrigations while that was 14-19 for puddle transplanted conventional irrigated plots. The puddle transplanted alternate wetting and drying field and dry direct seeded fields saved about 24% and 58% irrigation water compared with puddle transplanted conventional irrigated field. The study concluded that higher yield and economic return from boro rice could be achieved with use of least irrigation water by adopting dry direct seeded system.

## 27. EFFECT OF LEVEL OF PHOSPHORUS ON THE YIELD PERFORMANCE OF DIFFERENT VARIETIES OF SOYBEAN

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An experiment was carried out at the Agronomy Field Laboratory, Bangladesh Agricultural University, Mymensingh during January to April 2012 with a view to finding out the effect of level of phosphorus on the yield performance of different varieties of soybean. The experiment comprised of four varieties of soybean viz. BARI soybean 5, BARI soybean 6, BINA soybean 1 and BINA soybean 2 and four levels of phosphorus viz. 0, 40, 80, and 120 kg $P_2O_5$ $ha^{-1}$. The experiment was laid out in a randomized complete block design (RCBD) with three replications. Both variety and phosphorus level had significant influence on all the plant characters except number of plants $m^{-2}$ and stover yield. The highest number of nodes $plant^{-1}$ (13.17), number of branches $plant^{-1}$ (5.10), number of filled pods $plant^{-1}$ (51.16), number of seeds $pod^{-1}$ (3.00), seed yield (1.96 t $ha^{-1}$) and stover yield (4.08 t $ha^{-1}$) were found in the variety BARI soybean 5. The application of 80 kg $P_2O_5$ $ha^{-1}$ produced the highest number of filled pods $plant^{-1}$ (50.43), number of seeds $pod^{-1}$ (2.93), 100-seed weight (10.66 g), seed yield (1.95 t $ha^{-1}$) and stover yield (4.10 t $ha^{-1}$). The highest number of unfilled pods $plant^{-1}$ (7.81) was obtained from 0 kg $P_2O_5$ $ha^{-1}$. The interaction of variety of level of phosphorus had also exerted significant influence on the yield and yield parameters of soybean. The highest of number of nodes $plant^{-1}$ (13.66), number of filled pods $plant^{-1}$ (60.73), number of seeds $pod^{-1}$ (3.00), seed yield (1.95 t $ha^{-1}$)and stover yield (4.09 $tha^{-1}$) were found in treatment combination of BARI soybean 5 with 80 kg $P_2O_5$ $ha^{-1}$. From the present study it is concluded that BARI soybean 5 with 80 kg $P_2O_5$ $ha^{-1}$ may be used for obtaining better yield of soybean.

## 28. AMELIORATION OF SALINITY STRESS IN *bORO* RICE (CV. brri DHAN47) THROUGH TRANSPLANTING RE-ARRANGEMENT AND GYPSUM APPLICATION

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An experiment was conducted during December through May 2012 with a view to ameliorating salinity stress effects in *boro* rice cv. BRRI dhan47 through transplanting rearrangement and application of gypsum. The performance of *boro* rice in two transplanting methods viz. raised bed transplanting and traditional transplanting along with the combination of gypsum application (control and 1g gypsum per kg soil) were evaluated under five various levels of salinity stress (No salinity, 25 mM NaCl, 50 mM NaCl, 75 mM NaCl and 100 mM NaCl). The crops were grown in earthen *chari* in the net house of the Department of Agronomy, Bangladesh Agricultural University, Mymensingh. The results of the study show that both transplanting methods and application of gypsum had exerted significant positive influence in ameliorating salinity stress effects both individually and in combination. The combination of raised bed transplanting and application of gypsum was the best practice in amelioration of salinity stress in *boro* rice cv. BRRI dhan47. This treatment combination gave 3.9 t rice yield per ha at salinity level of 75 mM NaCl, where as at the same level of salinity there was no rice grain formation under traditional transplanting with no gypsum application.

## 29. HKT NETWORKING IN RICE- DOES IT MEDIATE SALINITY TOLERANCE OR SENSITIVITY?

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Increasing soil salinity due to irrigation practices and climate change is becoming detrimental for crop production worldwide. Most of the agricultural crop species are sensitive to high concentrations of salinity caused mostly by excess NaCl. However, multiple $Na^+$ transport systems have been evolved in plants over time to circumvent $Na^+$ toxicity in plants. Over the years many HKT members of transporter proteins have been identified and their physiological functions mediating $Na^+$ transport and its recirculation have been characterized in different plant species. In rice, nine HKT homologues are identified. Except one, they encode proteins with distinct transport activities in various tissues and/or organs. We have studied the expressions of the HKT members in salt-sensitive rice cultivar BRRI dhan29 and compared with that of salt tolerant rice cultivar Pokkali. We found that some of the HKT transporters like OsHKT2;l mediate $Na^+$ selective transport at the plasma membrane of root epidermal/ cortical cells and thus makes plant more salt sensitive. On the other hand, interestingly, OsHKT2;2, a $Na^+/K^+$-coupled transporter has been shown to mediate salt tolerance through increased $K^+$ uptake. OsHKT1;5 has been shown to be a $Na^+$-transporter, but contributing to the increased ability of salt-tolerance through re-circulating of $Na^+$ from xylem sap, and thus, by maintaining shoot $K^+$ homeostasis under salt stress. Results from various studies also suggest that cell specific expressions of OsHKT transporters in rice play very vital role in $Na^+/K^+$ uptake and their recirculation for maintaining cytosolic $Na^+/K^+$ homeostasis in cells and thus significantly enhance salt tolerance.

## 30. AGRONOMIC RESEARCH ADVANCEMENTS OF JUTE CROP IN bANGLADESH-A REVIEW

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Agronomic research advances of jute, kenaf and mesta crops were selected for its being large concentration points in relation to cultivation methods (seeding rate and proper time, intercultural operations, proper harvesting time) climate and soil, cropping pattern etc. on those yield and quality of fibre and seed in Bangladesh. Data were collected from different print media like different annual reports and journals during December 2011 to August 2012 at Agronomy Division, Bangladesh Jute Research Institute (BJRI), Dhaka. It was observed from the reviews that high and medium high land where rain and flood water does not stand are suitable for tossa jute cultivation. Jute requires a warm and humid climate with temperature fluctuating between $24^0$C and $37^0$C. The permissible relative humidity favorable to growth ranges between 70 and 90 percent. Rainfall ranges from 250mmn to 270mm are essential requisite for good growth and yield of jute. Proper seed rate is the main factor for plant population, growth and for maximum yield. Jute varieties are to be planted starting from 15 March, will help incorporate Tossa jute into three crop pattern. To concern *Hibiscus canabinus* L. varieties planting around 15 March to 30 April and *H. sabdarifa* L. varieties planting around

15 March to 15 May for optimum fibre yield. For seed production, the best time of seed sowing, in case of *C. capsularis* L. whole July and of *C. olitorious* L. within August 30, which give more seed yield. When sown earlier, premature flowering occurs and yield is drastically reduced with deterioration in quality. Weed posses a major problem in jute cultivation and weeding operation constitute about one third of the total cost of production. The major weeds in jute field were dected *Cyperus rotundus, Cynodon dactylon, Echinocloa colonum, Digitaria sangunalis, Cyperus iria, Eleusine indica, Panicum disticum.* First weeding, mulching and simultaneous thinning at 10-15 days after sowing (DAS), second weeding, mulching and simultaneous thinning at 25-30 DAS, third weeding, mulching and simultaneous final thinning and topdressing of urea fertilizer followed by hoeing 40-50 DAS were recommended. Besides, one tanabatch between 60-70 DAS and one katabatch around 90 DAS provide good effect on fibre yield. Improved cultivation technologies such as good quality seed of improved variety, proper sowing and harvesting time, recommended intercultural management with inputs increases the fibre and seed yields over conventional practices. The cropping patterns Jute-T. aman-Wheat, Potato-Jute-T. aman, Onion-Jute-T. aman, Vegetable-Jute-T. aman and Jute-T. aman-Mastard were sorted agronomically feasible and economically viable.

## 31. EFFECT OF SOWING TIME AND GENOTYPES ON THE YIELD AND YIELD ATTRIBUTES OF WHEAT

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An Experiment was conducted at Regional Wheat Research Centre, BARI, Shyampur, Rajshahi, 2011-12 with ten advance lines along with two check varieties Shatabdi and Prodip were evaluated under optimum and late seeding conditions for estimation of yield loss due to late sowing condition. The experiment was lay out Split plot design with three replications. Two seeding dates were placed in the main plots and genotypes in the sub-plots. The genotypes were evaluated for yield and yield contributing traits; days to heading, maturity, plant height, spike $m^{-2}$, spikelets $spike^{-1}$, thousand grain weight, disease reaction and visual grain quality, etc. The effect of seeding date was significant for most of the traits. The highest grain yield over seeding dates was produced by BAW 1170, followed by BAW 1171, BAW 1161, BAW 1163 and BAW 1168 respectively. These genotypes produced satisfactory yields in both seeding conditions. The genotype BAW 1157 gave the highest yield in ITS condition but it's grain size was small in ILS condition. Considering the overall yield and other characters 4 genotypes BAW 1161, BAW 1163, BAW1168 and BAW 1170 have been performed better both optimum and late sowing conditions. Due to late sowing conditions ranged of yield loss was 5.32 to 27.60%. On an average yield loss was recorded 16% Due to late sowing condition.

## 32. IMPROVING CROPS AND SOIL PRODUCTIVITY UNDER CHANGING CLIMATE THROUGH RESOURCE CONSERVATION TECHNOLOGIES

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A 7 years field study was conducted at the Regional Wheat Research Centre, Rajshahi as high temperature and water scarcity area to compare the effects of four tillage/straw management treatments (30% straw retention (SR)+permanent raised bed(PRB), 30% SR +conventional tillage (CT), 0% SR + PRB and 0% SR + CT) and five N levels (0, 40, 80, 100 and 120% of recommend N) in a intensified rice-wheat (RW) systems by adding a third pre-rice crop of mungbean. Permanent beds with 30% straw retention produced the highest productivity for all three crops. Within each N rate total system productivity was higher with 30% SR on PRB and least in CT with 0% straw retention. At 80% of recommended N rate, mean annual system productivity was 12.5 t/ha for PRB with 30% SR and 10.3 t/ha with CT without straw. The results suggest that N fertilizer rates can be reduced 20% when 30% straw is retained. Water use efficiency improved 25-30% under 30% SR with PRB system for all crops. Soil organic matter (SOM) increased 0.32% with blackish color after seven years under 30% SR on PRB. PRB systems with 30% straw retained produced 44% less emission of $CO_2$ into the atmosphere.

## 33. WEED CONTROL AND YIELD OF WHEAT AS AFFECTED BY BRASSICA ALLELOPATHY

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The experiment was conducted at the Agronomy research field, Sher-e-Bangla Agricultural University, Dhaka from November, 2008 to March, 2009 to find out the allelopathic effect of *Brassica* biomass on weed control and yield of wheat. The treatment of the experiment consisted of 2 levels of field status viz. fallow land ($C_1$) and field with *Brassica* ($C_2$); 2 levels of maturity viz. 25 days old *Brassic*a ($M_1$) and 35 days old *Brassica* ($M_2$); and 3 levels of *Brassica* biomass amount viz. 0 kg biomass $m^{-2}$ ($B_1$), 0.5 kg biomass $m^{-2}$ ($B_2$) and 1.0 kg biomass $m^{-2}$ ($B_3$). Maximum weed population at 30 DAS (165 $m^{-2}$) and at 60 DAS (291 $m^{-2}$), dry wt. of weeds at 30 DAS was found in the plots having no biomass. The highest dry weight of weed at 60 DAS was found from fallow land (107.77 $gm^{-2}$), 25 days old *Brassica* (78.80 $gm^{-2}$) & 0 kg biomass application (89.94 g $m^{-2}$). The highest grain yield was found from *Brassic*a fields (2.68 t $ha^{-1}$), 35 days old *Brassica* biomass (2.59 t $ha^{-1}$) & 1.0 kg biomass application (2.71 t $ha^{-1}$). The interaction effect of field status and *Brassica* biomass concentration showed significant result on weed population (80.33 $m^{-2}$), dry weight of weed (39.74 g $m^{-2}$), plant height (33.98 cm), number of effective tillers linear $m^{-1}$ (84.67), spike length (16.09 cm), number of filled grain $spike^{-1}$ (50.93), number of leaves $plant^{-1}$ (10.53), weight of 1000 grains (41.22 g), grain yield (2.83 t $ha^{-1}$) and straw yield (4.08 t $ha^{-1}$).The lowest weed population

(124.0 $m^{-2}$) and dry weight of weed (39.11 $gm^{-2}$) at 60 DAS was found from the field with *Brassica* and 25 days old biomass @ 1.0 kg $m^{-2}$. The highest thousand grain weight (41.84 g) was found from the field with 35 days old *Brassica* application @ 0.50 kg $m^{-2}$. The maximum grain yield (2.86 t $ha^{-1}$) was found from the field with 35 days old *Brassica* biomass application @ 1.0 kg $m^{-2}$. Weed population and weed dry weight showed highest result in fallow land with no biomass application. Fallow land, less matured biomass and no biomass application and their interaction encouraged growth of weed and dry weight of weed that means *Brassica* biomass reduced weed growth in all cases of application. Weed control was quite positive with *Brassica* biomass. On the other hand, land with *Brassica* and application of 35 days old *Brassica* biomass @ 0.5 -1.0 kg $m^{-2}$ increased yield contributing characters and yield of wheat.

## 34. ALLELOPATHIC EFFECT OF RICE STRAW AND WATER HYACINTH ON WEED CONTROL AND YIELD OF BORO RICE

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The experiment was conducted at the Agronomy research field, Sher-e-Bangla Agricultural University, Dhaka from November, 2009 to May, 2010 to find out the allelopathic effect of rice straw and water hyacinth biomass on weed control and yield of *boro* rice. The treatments of the experiment consisted of 2 rice varieties *viz*. BRRI dhan29 ($V_1$) and BRRI hybrid dhan2 ($V_2$); 2 allelopathic materials *viz*. rice straw ($M_1$) and water hyacinth ($M_2$); and 3 levels of biomass concentration *viz*. 0 kg biomass $m^{-2}$ ($C_0$), 0.5 kg biomass $m^{-2}$ ($C_1$) and 1.0 kg biomass $m^{-2}$ ($C_2$). The experiment was laid out in a spilt split-plot design with 3 replications having varieties in the main plots, allelopathic materials in the sub plots and concentrations in the sub sub-plots. The lowest weed population (11.33 $m^{-2}$ and 16.00 $m^{-2}$ at 30 and 50 DAT respectively) and minimum dry weight (4.89 g $m^{-2}$) at 30 DAT was found from rice straw application irrespective of variety. The highest grain yield (7.50 t $ha^{-1}$) was obtained from BRRI hybrid dhan2 with water hyacinth @ 1.0 kg $m^{-2}$. The highest number of effective tillers $hill^{-1}$ (19.67) was observed from BRRI dhan29 with water hyacinth @ 1.0 kg $m^{-2}$ and the lowest number of non-effective tillers $hill^{-1}$ (1.67) was recorded from the same variety with rice straw and at the same concentration. The highest panicle length (26.65 cm) was found in BRRI dhan29 with rice straw @ 1.0 kg biomass $m^{-2}$. BRRI hybrid dhan2, water hyacinth and 1.0 kg biomass $m^{-2}$ and their interactions encouraged growth and dry weight of weeds as well as yield of rice. Rice straw reduced weed growth whereas water hyacinth enhanced weed growth as well as grain yield of rice.

## 35. SCREENING OF RICE VARIETIES RESPONSIVE TO SRI (SYSTEM OF RICE INTENSIFICATION) IN *BORO* SEASON

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A field experiment was conducted at Agronomy field of Sher-e-Bangla Agricultural University, Bangladesh during December 2010 to May 2011. There were 16 popular inbred and hybrid rice varieties included in the study as BR3, BR14, BR16, BRRI dhan28, BRRI dhan29, BRRI

dhan36, BRRI dhan45, BRRI dhan50, BINA dhan6, BINA new line, BRRI hybriddhan1, BRRI hybriddhan2, BRRI hybriddhan3, Hira1, Chamak and Bhajan. The field was well prepared with organic manure & chemical fertilizers as recommended for SRI. Randomized Complete Block design was followed with three replications. Twelve days old seedlings were transplanted on January 7, 2011 maintaining 30cm x 30cm spacing. Crop growth parameters like plant height, number of tillers/hill, leaf area, dry matter production/hill were collected. Yield and other crop characters like number of effective and non-effective tillers/hill, number of filled and unfilled grains/panicle, weight of 1000 seeds, grain yield, straw yield were also collected. In respect of grain yield, the rice varieties BR 16 (6.86 t $ha^{-1}$), BRRI dhan36 (6.85 t $ha^{-1}$) and BRRI dhan45 (6.85 t $ha^{-1}$) showed significantly the highest yield that similar to BRRI dhan28 (6.30 t $ha^{-1}$), BRRI dhan50 (6.37 t $ha^{-1}$), Binanewline (6.33 t $ha^{-1}$), BRRI hybrid dhan1 (6.76 t $ha^{-1}$), BRRI hybrid dhan2 (6.44 t $ha^{-1}$), Hira1(6.65 t $ha^{-1}$) and Bhajan (6.45 t $ha^{-1}$). The lowest grain yield was found in BR14 (5.18 t $ha^{-1}$) and BR3 (5.37 t $ha^{-1}$) that similar to BRRI dhan29 (5.83 t $ha^{-1}$), Bina dhan6 (5.97 t $ha^{-1}$), BRRI hybrid dhan3 (5.89 t $ha^{-1}$) and Chamak (5.59 t $ha^{-1}$). The variety BR16 showed significantly the highest number of effective tillers $hill^{-1}$ (27.33) that followed by BR3 (26.73) and BRRI hybrid dhan1 (26.40) whereas the lowest number of effective tillers $hill^{-1}$ was found in BRRI hybrid dhan3 (19.67) that similar to Binanewline (20.13) and BR14 (20.40). In respect of non-effective tillers $hill^{-1}$, the variety BRRI hybrid dhan2 resulted the lowest value (3.60 tillers $hill^{-1}$). The highest 1000 grain weight (30.63 g) was given by the variety BR3 and BR14 whereas the lowest 1000 grain weight (19.07 g) was found in BRRI dhan50 that followed by BRRI dhan29 (21.83 g) and BRRI dhan28 (22.11 g).

## 36. HEAVY METAL CONTENT IN SOME SPICES GROWN IN INDUSTRIALLY POLLUTED AND NON-POLLUTED AREAS

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Field survey based laboratory studies were carried out to investigate the heavy metal contents in spices and soils collected from industrially polluted and non-polluted areas. The content of three toxic heavy metals such as lead (Pb), cadmium (Cd), and nickel (Ni) in three common spices namely include Onion (*Allium cepa*), garlic (*Allium sativum*) and Chilli (*Capsicum annuum*) and the rizosphere soils of the respective crops were collected from three locations viz. i) directly polluted (Kalakoir, Konabari, Gazipur), ii) indirectly polluted (Dhollar bill, East Kalakoir, Konabari, Gazipur), and iii) non-polluted (Bangladesh Agricultural Research Institute-BARI, Gazipur) during the month of January, 2012. Regardless of locations, there were significant differences ($P<0.01$) in the average Pb, Cd, and Ni concentrations (µg $g^{-1}$ of dry weight) in different spice plant and the soils in which they were grown. In all three spice plant a similar trend in metal contents was observed i.e. Ni>Pb>Cd and the degree of pollution was directly polluted>indirectly polluted>non-polluted. The Pb, Cd and Ni concentrations were found in the order of garlic>chilli>onion, garlic>chilli>onion and garlic>onion>chilli, respectively. Regardless degree of pollution, most of the metal accumulated in bulb/fruit,

remains in root and the smallest amount in the leaf. Mean concentration of Pb, Cd, and Ni in spice plants and in soils from non-polluted area were below the recommended level, except Ni.

## 37. PHYSIOLOGICAL EVALUATION OF WHEAT GENOTYPES UNDER WATER DEFICIT CONDITION

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A field experiment was carried out at research field of the Bangabandhu Sheikh Mujibur Rahman Agricultural University during 2011-2012 to evaluate the performance of wheat genotypes for water stress tolerance. Eleven wheat genotypes selected from 1st experiment were evaluated against two moisture regimes i.e. water cut after crown root initiation (CRI) stage and no water stress throughout the cropping season. Marked variation was observed in percent yield reduction due to water stress and it ranged from 23-57% among the genotypes tested. The yield contributing attributes such as spikes plant$^{-1}$, grains spike$^{-1}$ and 1000 grain weight reduced drastically due to water deficit. Plant height, flag leaf length and flag leaf area also decreased remarkably in susceptible genotypes under water stress. The chlorophyll content varied significantly among the genotypes after anthesis but the reduction was higher as well as earlier in susceptible ones. The days to heading, days to anthesis and days to physiological maturity decreased significantly due to the influence water deficit irrespective of genotypes. The relative water content (RWC) decreased with water stress in all the tested genotypes but the reduction was least in tolerant ones. On the other hand, the canopy temperature was lower in tolerant genotypes indicating the ability to maintain the cooler canopy environment than the susceptible ones. The osmoregulator proline and total soluble sugar also increased in tolerant genotypes under water deficit condition. Different drought screening techniques such as relative yield, drought susceptibility index and drought tolerance index indicated that BARI Gom-26, Sourav and BAW-1169 are tolerant, BAW-1167, BARI Gom-25 and BAW-1157 are susceptible and others are moderately susceptible genotypes. The genotypes BAW-1158 and BAW-1170 are also considered as drought escaper due to its earliness in heading and anthesis than other genotypes.

## 38. PERFORMANCE OF SOME DWARF SOYBEAN (*Glycine max*) AS INFLUENCED BY PLANTING TIMES

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Two experiments were conducted with 10 dwarf genotypes of Soybean to evaluate their agronomic performance at two planting times, viz. sown on 10 October, 2011 and 19 January, 2012 in the Field of the Department of Agronomy, BSMRAU. The genotypes were G00041, G00042, G00046, G00053, G00154, G00166 G00197, G00204, G00221, G00351 and standard check variety BARI soybean 5. Data were collected on emergence percentage, stand establishment/m$^2$, days to first flowering, days to 50% flowering, days to first pod maturity, days to 50% pod maturity, days to harvest, plant height (cm) at maturity, no. of pod/plant, no. of seed/ pod, weight of 100-seed, seed yield/ plant and harvest index . Percentage of seedling emergence was found satisfactory (> 80%) in all the genotypes during January planting, except

G00204. However, in October planting the satisfactory emergence was observed only in the genotype G00197 (83.33%) and BARI soybean 5 (85%). Similarly stand establishment was not satisfactory in the genotypes. The genotypes flowered at least 12 days earlier during October planting than that of January planting. Similarly, days to 50% flowering, days to 50% pod maturity and days to harvest were at least 8 days, 8 days and 10 days earlier respectively in October planting than that of January planting. Plant height at maturity was higher in January planting in all the genotypes (2 to 11 cm higher) than that of October planting, except in genotype G000204 that shows similar plant height in both the planting times. Performance of genotypes on number of pod / plant varies with the planting times. Genotypes G00041, G00041, G00042, G00046, G00204, G00221, G00351 and BARI5 showed higher no. of pod /plant in January planting and genotypes G00053, G00154, G00166 and G00197 showed higher no. of pod /plant in October planting. No. of pod /plant was the highest in genotype G00166 (2.07) and the lowest was in BARI soybean 5 (1.61). Weight of 100-seed in all the genotypes were higher in January planting than that in October planting. January planting showed higher seed yield/plant in all the genotypes, with the highest in genotype G00166 (6.88 g/ plant) and the lowest was in G00204 (2.89 g/plant). Planting time did not affect harvest index (HI). The HI was the highest in genotype G00197 (0.59) and the lowest was in G00154 (0.45). Considering all the parameters genotypes G00166 and G00197 may be used as breeding materials for developing a dwarf high yielding and short duration variety.

## 39. WATER STRESS TOLERANCE OF SOYBEAN

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An experiment was conducted at the Environmental Stress Research Site of the Agronomy Department of Bangabandhu Sheikh Mujibur Rahman Agricultural University during January 2012 to identify water stress tolerant soybean genotypes. Fifty soybean genotypes were screened against water stress. The treatments were i) well water; water was applied as and when it was needed, and ii) water stress throughout the growing period. Water stress imposed by withholding irrigation until appearance of wilting. The results revealed that water stress decreased seed yield significantly in all the genotypes, which was on an average 69%. Relative yield of four genotypes, viz. BD 2331, Shohag, BARI Soybean-6 and BARI Soybean-5 was > 0.5. Relative yield of 17 genotypes, viz. MTD 459, BGM 2026, GOOO83, MTD 453, PK 416, BD 2340, GOO342, GOOO15, GOOO84, BD2336, BGM 2093, BD 2329, GOO127, GOOOO3, GOO209, GOO163, and BD2325 was ranged from 0.3 to 0.39. The rest 29 genotypes showed less than 0.3 relative yield. The largest reduction in seed yield due to water stress was in BD 2327 (1.09 gm/ plant). Therefore, genotype BD 2331 was rated as the most water stress tolerant soybean line followed by Shohag, BARI Soybean-6 and BARI Soybean-5.

## 40. WEED MANAGEMENT IN BLACKGRAM UNDER BED PLANTING SYSTEM

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This experiment was conducted at PRC, RARS Ishurdi during kharif-2 season of 2011 to find out suitable weed control method of BARI Mush-3 in bed planting system. There were five treatments are as follows :$T_1$ = Bed planting+ mulching @ 3 tone $ha^{-1}$, $T_2$ = Bed planting+ continuous weeding (3 weeding $T_3$ = Bed planting+ herbicides application after 25 DAE with 2-4 D Amine, $T_4$ = Bed planting+ Spading between the two beds after 25 DAE,) and $T_5$ = Bed planting + No weeding *i.e.* control. The highest pods per plant (9.47 no.) were recorded from $T_1$ *i.e*. mulching treatments followed by $T_3$ treatment and $T_2$ treatment. The maximum seed yield (1255 kg/ha) was also recorded from$T_1$ *i.e*. mulching treatment plot followed by $T_2$ and $T_4$ treatment. The lowest seed yield was obtained from $T_5$ treatment *i.e.* control treatment plot.
Partial budget analysis of BARI Mush-3 in different treatments are presented in Table 2. The highest gross margin (Tk. 36254 /ha) was obtained from the treatment $T_1$, followed by $T_2$ treatment (Tk. 27629 / ha). The lowest gross margin (Tk.21504 / ha) was obtained from $T_4$ treatment. The highest benefit cost ratio (BCR) was obtained from the treatment $T_1$ (2.36) followed by $T_2$ treatment (2.08).

## 41. EFFECT OF PLANTING PATTERN ON PRODUCTIVITY AND ECONOMICS OF COTTON+MUNGBEAN INTERCROPPING SYSTEM

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To maximize the benefit from cotton+mungbean intercropping system, the appropriate planting pattern need to be determined. An experiment was conducted during 2009-2010 cropping season at the Cotton Research Farm, Sreepur, Gazipur, to determine an appropriate planting pattern in cotton + mungbean intercropping system. Performance of eight different planting patterns was compared against sole single and paired row cotton and sole mungbean. The planting patterns were significantly influenced yield and yield contributing characters, physiological and morphological parameters of both cotton and mungbean. Gin and qualitative characters of cotton also influenced significantly by the planting patterns. Increasing mungbean density between cotton rows decreased plant height and dry matter accumulation in cotton but the reverse in plant height of mungbean was evident. Intercropping reduces individual yield of cotton and mungbean compared to that of sole cropping, though land equivalent ratio (LER) showed 10-31% advantage over sole cropping. The planting pattern of paired row cotton+4-row mungbean showed the highest LER (1.31) than those of other patterns. The highest seed cotton (2951 kg $ha^{-1}$) and mungbean (3373 kg $ha^{-1}$) equivalent yield, net profit (Tk. 60220 $ha^{-1}$) and BCR (2.04) were achieved from the same pattern. Positive monitory advantage index (MAI) showed yield advantage in all the patterns of cotton+mungbean intercropping system.

The highest value of MAI (27670) was achieved from paired row cotton+4-row mungbean. Higher value of RCC, CR of cotton than mungbean and positive value of aggressivity of cotton indicated that cotton was more competitive and dominant in cotton+mungbean intercropping system. The highest RCC value from paired row cotton+4-row mungbean determined more competitive and dominant pattern over all patterns. Results suggested that growing of 4-row mungbean in between 2 cotton paired row can be recommended as potential planting pattern.

## 42. COMPETITIVE BEHAVIOR OF COMPONENT CROPS IN COTTON+MUNGBEAN INTERCROPPING SYSTEM UNDER VARYING SOWING DATES OF MUNGBEAN

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To achieve the highest benefit from cotton+mungbean intercropping system with spatial arrangement of paired row cotton+4-row mungbean, it is necessary to determine their temporal arrangement. An experiment was conducted during 2010-2011 cropping season at the Cotton Research Farm, Sreepur, Gazipur to know the proper sowing time of mungbean intercropping with cotton. The treatments included sowing of mungbean simultaneously with, 15 and 30 days before and after the cotton. Temporal arrangement of mungbean significantly influenced yield and yield contributing characters, physiological and morphological parameters of cotton and mungbean. Economic and intercropping efficiencies were significantly differing within the treatments. Mungbean sown after cotton increases cotton yield but reduces mungbean yield. Whereas, mungbean sown before cotton showed reverse in cotton and mungbean yield. The highest cotton equivalent (2199 kg $ha^{-1}$) and mungbean equivalent (2095 kg $ha^{-1}$) yield was obtained from simultaneous sowing. Land equivalent ratio (LER) and monetary advantage index (MAI) value showed advantages in simultaneous sowing and mungbean sown after cotton over mungbean sown before cotton. The highest LER (1.22) and MAI (23380) value from simultaneous sowing establish the yield advantages in cotton+mungbean intercropping system. Aggressivity and competitive ratio showed the dominancy of cotton over mungbean in simultaneous sowing and mungbean sown after cotton sown, while mungbean become more dominant when mungbean sown before cotton sown. Relative crowding coefficient (RCC) value indicated that cotton was more competitive than mungbean in simultaneous sowing and mungbean sown after cotton, while less in mungbean sown before cotton. Highest RCC value (5.01) from simultaneous sowing determined more competitive and dominant over all the treatments. Highest net profit (71830 Tk $ha^{-1}$) and higher BCR (2.19) were obtained from paired row cotton+4-row mungbean with simultaneous sowing. Intercropping cotton and

mungbean by practicing 4-row mungbean in between 2 paired row cotton with simultaneous sowing can be recommended as a potential and profitable pattern.

## 43. EFFECT OF NPK ON NUTRIENT UPTAKE, PRODUCTIVITY AND ECONOMICS IN COTTON+MUNGBEAN INTERCROPPING SYSTEM

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The potential planting pattern (paired row cotton+4-row mungbean with simultaneous sowing) of cotton+mungbean intercropping system, as determined in the previous study, was examined for determining appropriate N, P and K dose for maximum productivity and economic return. The experiment was conducted during 2010-2011 cropping season at the Cotton Research Farm, Sreepur, Gazipur. Five different combinations of cotton and mungbean with recommended N, P and K doses were compared against their sole cropping and control. Different doses of N, P and K significantly influenced yield and yield contributing, physiological and morphological parameters of cotton and mungbean. Also nutrient and intercropping efficiencies and economic values were significantly differing within the treatments due to yield differences. Seed cotton and mungbean yield was increased with incremental of N, P and K doses. The highest cotton equivalent (2780 kg $ha^{-1}$) and mungbean equivalent (2648 kg $ha^{-1}$) yield was obtained from cotton recommended NPK+50% mungbean recommended NPK dose. Same trend was observed in land equivalent ratio (LER) and monetary advantage index (MAI) which indicated intercropping advantage. The highest value was obtained from cotton recommended NPK+50% mungbean recommended NPK doses. N, P and K uptake in cotton and mungbean was rising with increasing N, P and K dose and the highest uptake was observed at the mature stage. Similar trend was also observed in apparent recovery of N, P and K and SPAD values of cotton and mungbean leaf. Intercropping decreased agronomic and physiological efficiency of N, P and K both in cotton and mungbean compared to their sole cropping. Higher values of N, P and K utilization and use efficiency of cotton than mungbean in cotton+mungbean intercropping system showed that cotton was more competent and efficient in nutrient utilization and use. Highest net return (103716 Tk $ha^{-1}$) and BCR (2.64) was obtained from cotton recommended NPK+50% mungbean recommended NPK dose. The result of the experiment showed that paired row cotton+4-row mungbean with simultaneous sowing can be grown profitably applying N,P and K cotton recommended+50% mungbean recommended dose.

## 44. EFFECT OF SOWING DATES ON YIELD AND QUALITY OF TROPICAL SUGAR BEET GENOTYPES FERDOUS, H. M., Q. A. KHALIQ and

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A field experiment was conducted at the research farm of the Department of Agronomy, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur, Bangladesh from November 2011 to May 2012 to find out the optimum sowing date of tropical sugar beet in Bangladesh. The tropical sugar beet genotypes were Cauvery, Shubhra and EB0616, and sowing dates were 01 November, 15 November, 01 December and 15 December. The interaction effect of sowing dates and sugar beet genotypes was statistically significant in root weight per plant, whole plant weight, root yield and sucrose yield. The highest root yield was obtained in genotypes EB0616 when sown on 01 November (103.5 t/ha) and on 15 November (100 t/ha). The genotypes Cauvery and Shubhra gave identical root yield i.e., 90.27 t/ha and 92.86 t/ha, respectively on 01 November sowing. Irrespective of sowing dates, brix%, pol% and sucrose yield were determined at the crop age of 165 days. The highest sucrose yield in the genotype Shubhra (14.23 t/ha) was recorded when the seeds were sown on 01 November, while the genotype EB0616 gave the highest sucrose yield when sowing was done on 01 November (14.83 t/ha) and on 15 November (14.22 t/ha). Root yield and sucrose yield significantly decreased in all the three genotypes with the advancement of sowing dates from 01 November onwards. For high root and sucrose yield the optimum sowing date for tropical sugar beet in Bangladesh seems to be early November.

## 45. EFFECT OF APPLIED NITROGEN ON GROWTH, YIELD AND NUTRIENT UPTAKE IN BUSH BEAN GENOTYPES

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A field experiment was carried out at the Agronomy Research Farm, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur, Bangladesh during the winter season of 2006-2007 to determine the effect of applied nitrogen on growth, nutrient uptake and yield in bush bean genotypes. The bush bean genotypes were BARI Jharsheem-1, BB-9 and BB-15, and nitrogen levels were 0, 50, 100 and 150 kg N $ha^{-1}$. Nitrogen levels exerted significant effect on plant growth, nutrient uptake and yield in bush bean genotypes. Plant height, number of branches per plant, leaf area index (LAI), total dry matter (TDM) and crop growth rate (CGR) increased progressively with the increased level of nitrogen up to 150 kg $ha^{-1}$ in BARI Jharsheem-1 and up to 100 kg $ha^{-1}$ in BB-9 and BB-15. Nitrogen levels had significant effect on days to maturity. The highest level of nitrogen delayed maturity in the genotypes. Nitrogen levels had significant influence on CGR, RGR and NAR (net assimilation rate). BARI Jharsheem-1 had greater allocation of dry mass (73.75%) into its reproductive part than the genotypes BB-9 (62.86%) and BB-15 (61.39%). The higher the level of nitrogen, the greater was the SPAD value throughout the growth period. Nitrogen levels significantly influenced the tissue nitrogen content and nitrogen uptake. The relationship between nitrogen levels and plant tissue nitrogen content was linear. Nitrogen uptake by the genotypes varied due to the variation in nitrogen levels. Nitrogen levels had significant effect on yield. Pods $plant^{-1}$, seed $pod^{-1}$, pod length, seed yield $plant^{-1}$, 100-seed weight, seed yield and green pod yield increased up to 150 kg N $ha^{-1}$ in BARI Jharsheem-1 and up to 100 kg N $ha^{-1}$ in the genotypes BB-9 and BB-15. The genotype BB-9 gave the highest seed yield (1.89 t $ha^{-1}$) and BARI Jharsheem-1 gave the lowest

seed yield (1.14 t $ha^{-1}$). The genotype BARI Jharsheem-1 gave the highest green pod yield (12.40 t $ha^{-1}$) and BB-15 gave significantly the lowest green pod yield (10.92 t $ha^{-1}$).

## 46. EFFECT OF APPLIED PHOSPHORUS ON GROWTH, YIELD AND NUTRIENT UPTAKE IN BUSH BEAN GENOTYPES

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A field experiment was conducted at the Agronomy Research Farm, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur, Bangladesh during the winter season of 2006-2007 to determine the effect of applied phosphorus on growth, nutrient uptake and yield in bush bean genotypes. The bush bean genotypes were BARI Jharsheem-1, BB-9 and BB-15, and phosphorus levels were 0, 30, 60 and 90 kg P $ha^{-1}$. Phosphorus fertilizer exerted significant effect on plant growth, nutrient uptake, yield and yield attributes in bush bean genotypes. Plant height, number of branches $plant^{-1}$, LAI, TDM and CGR increased with the increasing level of P up to 90 kg $ha^{-1}$ in the genotype BARI Jharsheem-1 and BB-15; and up to 60 kg $ha^{-1}$ in the genotype BB-9. Accumulation of dry mass into component organs of BARI Jharsheem-1 and BB-15 increased with the increasing level of P up to 90 kg $ha^{-1}$; and up to 60 kg $ha^{-1}$ in BB-9. Phosphorus levels had significant influence on CGR throughout the growth stages but did not have significant effects on RGR and NAR. Phosphorus fertilizer did not exert significant effect on SPAD value of leaf. Phosphorus contents and P uptakes gradually increased with increasing level of P up to 90 kg $ha^{-1}$ in BARI Jharsheem-1 and BB-15, and up to 60 kg $ha^{-1}$ in BB-9. BARI Jharsheem-1 and BB-15 gave the highest pods $plant^{-1}$, seeds $pod^{-1}$, pod length, seed yield $plant^{-1}$, 100-seed weight, seed yield and green pod yield at 90 kg $ha^{-1}$, Whereas, BB-9 gave the highest yield at 60 kg $ha^{-1}$ and further increase in P level decreased yield. The seed yield in the genotypes BARI Jharsheem-1, BB-9 and BB-15 increased by 63%, 22% and 27%; and green pod yield by 66%, 42% and 21% over control, respectively due to applied P. BARI Jharshemm-1 gave the highest green pod yield (12.44 t $ha^{-1}$) whereas BB-9 gave the highest seed yield (1.92 t $ha^{-1}$). BB-15 gave the lowest green pod yield (10.93 t $ha^{-1}$) and BARI Jharsheem-1 gave the lowest seed yield (1.40 t $ha^{-1}$). The genotype BARI Jharsheem-1 gave 10% and 14% higher green pod yield than the genotypes BB-9 and BB-15, respectively and BB-9 gave 37% and 4% higher seed yield than the genotype BARI Jharsheem-1 and BB-15, respectively.

## 47. EFFECT OF APPLIED NITROGEN AND PHOSPHORUS ON GROWTH, YIELD AND NUTRIENT UPTAKE IN BUSH BEAN

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A field experiment was conducted with the combination of four levels of nitrogen (0, 60, 120, and 180 kg N $ha^{-1}$) and four levels of phosphorus (0, 40, 80 and 120 kg P $ha^{-1}$) to find out the response of BARI Jharsheem-1 in terms of growth, nutrient uptake and seed-and green pod yield to applied nitrogen and phosphorus. The experiment was carried out at the Agronomy Research Farm, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur,

Bangladesh during the winter season of 2007-2008. Plant height, number of primary branches plant, LAI, TDM and DM partitioning into components significantly increased over time with the gradual increment of N and P up to 180 kg N $ha^{-1}$ and 120 kg P $ha^{-1}$, respectively. Nitrogen levels had significant effect on RGR at initial growth stages. Nitrogen level exerted significant effect on SPAD values throughout the growth period though P and interaction of N and P did not. Nitrogen and P levels, and their interaction had significant effect on total N and P uptake; and N and P content. The treatment combination of 180kg N $ha^{-1}$ and 80 kg P $ha^{-1}$ gave the highest amount of N (165.12 t $ha^{-1}$) and P ((14.47 kg $ha^{-1}$) uptake, and N and P content. The higher the P level the greater was the N content in both the vegetative parts and grains. Similarly the higher the N levels the higher was the P content in the vegetative parts and in grain. Nitrogen and P levels and their interaction had significant effect on the yield. Pods $plant^{-1}$, seed $pod^{-1}$, pod length, seed yield $plant^{-1}$, 100-seed weight, seed yield and green pod yield significantly increased with the increasing level of N and P. Increasing level of N coupled with increasing level of P contributed to higher yield. The treatment combination of 180 kg N $ha^{-1}$ and 80 kg P $ha^{-1}$ gave the highest seed yield ( 2.64 t $ha^{-1}$) and green pod yield (23.78 t $ha^{-1}$) which were 226% and 197% higher over the control. Nitrogen and P levels and their interaction exerted significant effect on HI. Agronomic and physiological efficiencies of N and P utilization were influenced significantly by N and P levels. Nitrogen use efficiency increased with increased level of P, and P use efficiency increased with increased level of N, respectively.

## 48. EFFECT OF HERBICIDES ON WEED CONTROL, CROP PERFORMANCE AND SOIL PROPERTIES IN BORO RICE

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A field experiment was conducted at the Experimental Farm of the Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Salna, Gazipur under wet land condition during November to May 2009-2010. Eight different weed control treatments i.e. Ronstar 25EC (Oxadiazon), Fastmix EW (Butachlor), Commit 500EC (Pretilachlor), MCPA 500 (MCPA-500) which were used as pre-emergence and Manage 10WP (Pyrazosulfuron-ethyl), Hammer 24EC (Carfentrazon ethyl) which were used as post emergence, One hand weeding (45 days after transplanting), Two hand weeding (30 days after transplanting and 60 days after transplanting), Weed free and Control (Unweeded) were arranged in a RCBD experiment with three replications. The most important weed species of the experimental plots were *Scirpus maritimus, Echinochloa crussgalli, Sphenoclea zeylancia and Monochoria vaginalis.* Weed free treatment performed the best in terms of weed control efficiency as well as crop growth. Among the herbicidal treatments, Manage 10WP performed better in growth characteristics of crop and Hammer 24EC performed the worst. Manage 10WP produced highest yield 5.23 t $ha^{-1}$ which was statistically similar to weed free treatment. In terms of profitability Manage 10WP showed the highest benefit cost ratio (1.59) where as the unweeded treatment produced the lowest benefit cost ratio (0.73). Significant changes in soil chemical properties were observed due to herbicide application. Manage 10WP (Pyrazosulfuran-ethyl) and Commit 500EC (Pretilachlor) herbicides can be used at field level at recommended dose due to its higher

weed control efficiency, higher grain yield, higher BCR and minimum adverse impacts on crop growth as well as soil environment.

## 49. EEFFECTS OF BED PLANTING TECHNIQUE IN MUNGBEAN CULTIVATION

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Greater Faridpur region is blessed with river Padma where usually rice, wheat, jute, vegetables, pulses and various rabi crops are grown. But the yields of crops are reducing day by day due to various constraints including severe arsenic problem. Bed planting in crop production practice is, recently, new conservation agriculture (CA) technique to mitigate this arsenic problem as well as increasing crop yields. Mungbean, a short duration pulse crop, was cultivated through a bed planter at Bishwanathpara, Goalando under Rajbari district during kharif-I, 2012 where formation of bed, seed sowing and fertilizer application were done at a time. The trial was laid out in RCB design with five farmers' replicates having plot size 24m x 18m. BARI mug 6 was used as the planting material. CSISA-CIMMYT Faridpur Hub team provided technical guideline to them to execute the field activities. Each farmer followed three production practices (as treatment) viz. $T_1$= Bed planting + recommended fertilizer dose (21-17-18 kg/ha N-P-K), $T_2$= Bed planting + Farmers' fertilizer dose (12-10-10 kg/ha N-P-K) and $T_3$= Conventional planting + Farmers' fertilizer dose. The seeds were sown during 16-20 April 2012. No irrigation was provided. Weeding cum thinning was done twice, first at 12-15 days after sowing (DAS) and second at 25-30 DAS. The pods were harvested 3-5 times started from 12 June and continued up to 14 July 2012 over the farm families. Among the three production practices Bed planting with recommended fertilizers ($T_1$) produced the highest seed yield (1735 kg/ha) and it was around 54% higher over the conventional planting with farmers' fertilizers package ($T_3$). Similarly, gross return (Tk. 1,12,775/ha) and gross margin (Tk. 83,995/ha) were also higher in Bed planting with recommended fertilizers package ($T_1$).

## 50. PERFORMANCE OF MODERN ONION VARIETIES AT CHAR LAND AREA

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An experiment was carried out in the char land area at the Multi-location Testing (MLT) site, Bhuapur Tangail during two consecutive years 2010-11 and 2011-12 in the medium high land situation under AEZ 8 to introduce the modern onion varieties in the locality and to increase economic return of farmers. The trial was laid out in RCB design with 6 replications (farmers). Farmers are the members of Integrated Crop Management (ICM) club/FFS who were selected with the help of local DAE personnel. The unit plot size was 6m x 5m. Two modern varieties viz. BARI Piaz-1 and BARI Piaj 4 were verified against a local one and Zitka (a Manikgonj local cultivar). The crop was fertilized with 115-40-75-27 $kgha^{-1}$ N-P-K-S respectively. The seedlings of 38-42 old were transplanted during 4-10 January, 2012 maintaining 15cm X 10cm

plant spacing. Two weedings, three irrigations along with other crop management practices were done as and when necessary. The crops were harvested during 5-12 April, 2012 irrespective of farmers replicates. The variety BARI Piaj 4 gave the highest bulb yield of 17.36 t ha-$^{1}$ and it was around 91% higher over that of local cultivar (9.08 t ha-$^{1}$).

## 51. PERFORMANCE OF DROUGHT TOLERANT NERICA AND GREEN SUPER RICE GENOTYPES IN DIFFERENT SEASONS AND LOCATIONS OF BANGLADESH

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Drought has been recognized as one of the biggest limiting factor to rice production specially in the rainfed ecosystem. Effort has been carried out to introduce new rice genotypes tolerant to drought stress with higher yield. An experiment was carried out at BRAC Agricultural Research and Development Centre, Gazipur during Aman 2011 and Boro 2012 and in Rajshahi during Boro 2012 to evaluate the performance of NERICA and Green Super Rice genotypes under drought condition. Artificial drought was created by withdrawing irrigation water at key growth stages. Five drought tolerant rice genotypes were used as experimental materials. These were N4, N10, N20, GSR IRRI I 2 and GSR IRRI I 40. The experiment was laid out in randomized complete block design with 3 replications. The rice genotypes differed significantly ($P<0.05$) with respect to plant height, tiller production, spikelet panicle$^{-1}$, filled grain panicle$^{-1}$, spikelet fertility, thousand grain weight and yield. Spikelet panicle$^{-1}$ and spikelet fertility was highest in GSR IRRI I 40 in both Aman 2011 and Boro 2012 seasons in Gazipur. In Rajshahi, spikelet panicle$^{-1}$ was highest in GSR IRRI I 40 and spikelet fertility was highest in GSR IRRI I 2 during Boro 2012. Highest grain yield was observed in GSR IRRI I 40 in both the seasons and locations.

## 52. EFFECT OF DIFFERENT LEVELS OF NITROGEN AND TRANSPLANTING DEPTH ON GROWTH AND YIELD OF BRRI dhan50

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A field experiment was conducted at Sher-e-Bangla Agricultural University, Dhaka, Bangladesh during November 2010 to April 2011 to study the effect of different levels of nitrogen and transplanting depth on the growth and yield of BRRI dhan50. The experiment consists of 4 different levels of N (0, 92, 115 and 136 kg ha$^{-1}$) and 3 levels of transplanting depth (1.5, 3.0 and 4.5 cm). The experiment was laid out in split-plot design with three replications. Both nitrogen levels and transplanting depth had significant effects on most of the growth and yield contributing characters. The results revealed that the maximum number of effective tillers hill$^{-1}$ (14) was recorded from the combination of 136 kg N ha$^{-1}$ and transplanting at 4.5 cm depth, again the minimum number (8.50) was found from 0 kg N ha$^{-1}$ and transplanting at 1.5 cm. The highest grain yield (6.41 t ha$^{-1}$) was recorded from the combination of 115 kg N ha$^{-1}$ and transplanting at 3.0 cm. It may be concluded that growth and yield of BRRI dhan50 were greatly influenced by nitrogen level and transplanting depth.

Applications of 115 kg N $ha^{-1}$ along with a blanket dose of $P_{25}K_{60}S_{24}$ kg $ha^{-1}$ at transplanting depth 3.0 cm provided the maximum yields of BRRI dhan50.

## 53. EFFECT OF LIFTING TIME AND TUBER SIZE ON AMBIENT STORAGE PERFORMANCE OF POTATO DERIVED FROM TRUE POTATO SEED

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The present study was investigated on the natural storage performance of potato derived from TPS as affected by lifting period after haulm killing and tubers sizes. Five lifting period viz., $L_0$ (0 days after haulm killing), $L_1$ (3 days after haulm killing), $L_2$ (6 days after haulm killing), $L_3$ (9 days after haulm killing) and $L_4$ (12 days after haulm killing) and 3 tuber size (small, medium and large) were used individual and combinedly as treatment for this study. The experiment was laid out in a completely randomized design (CRD) with 3 replications. The natural storage performance of tubers were influenced by lifting period and /or tuber size. Most of the post harvest parameters of tuber viz., dry matter content, weight loss, rotten tuber, total soluble solid content, days to sprout initiation, days to shriveling and apical sprout length showed better performance with increasing lifting period. Among the tuber sizes, small sized tubers showed better post harvest performance compared to those of large and medium. Among the lifting periods and tuber sizes, $L_3$ (9 days after haulm killing) and small sized tuber showed better natural storage performance.

## 54. EFFECT OF TUBER SIZE AND PLANT SPACING ON GROWTH AND YIELD OF SEEDLING TUBER DERIVED FROM TRUE POTATO SEED

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A field experiment was conducted at the research field of Sher-e-Bangla Agricultural University, Dhaka, during the period from 10 November 2009 to 10 March 2010 to investigate the effect of seed tuber weight and plant spacing on morpho-physiological characters, yield attributes and yield of potato. The experiment comprised of four different weight of seed tubers *viz*., 40 ± 2, 30 ± 2, 20 ± 2 and 10 ± 2 g and three plant spacing *viz*., 60 × 25, 60 × 20 and 60 × 15 cm. The experiment was laid out in randomized complete block design with three replications. All growth parameters and yield attributes such as tubers $hill^{-1}$ and tuber weight and tuber yield of gross, marketable and non-marketable were significantly influenced by seed tuber weight and plant spacing. For combined effect of tuber weight and plant spacing, the highest gross and marketable tuber yield was observed from the combination of 40 ± 2 g tuber with the plant spacing of 60 × 25 cm. But economic point of view with high yield performance, the seed tuber size of 30 ± 2 g with plant spacing of 60 × 20 cm was more profitable than those of other treatment combinations.

# 55. BORO CULTIVATION IN GHERS WITHOUT PLOUGHING SAVES MONEY

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Boro rice followed by either prawn or carps is one of the major cropping sequences in the *ghers* of south western part of Bangladesh. The system has potentials of reducing production cost by adopting zero tillage Boro. A study was conducted to evaluate the effect of zero tillage practice on the cost of rice production in rice - fish system at Raymohal village under Dumuria Upazila of Khulna district during Boro season in 2011-12. Zero tillage Boro was compared with conventional puddling method of rice establishment under recommended crop management practices in farmers' *ghers.* Results revealed that zero tillage plot gave a comparable yield as obtained with the conventional tillage. The zero tillage practice not only saved the ploughing cost but also reduced the time of land preparation. The zero tillage Boro could be extrapolated in Boro rice under rice-prawn/carp cropping sequence.
Key words: Zero tillage, Boro rice, Rice-prawn/carps cropping sequence, productivity

# 56. EVOLUTION OF COMPOST MATURITY iNDEXES IN DIFFERENT ORGANIC WASTES

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Maturity refers to a specific state of composted organic matter which is related to the quality and quantity of organic compounds remaining after the active phases of the process and to the intensity of the biological activity in the final product. In order to verify the effectiveness of lipids as indicators of compost maturity, different organic substrates (cow-dung, chicken slaughter house and cheese industries residues) were composted in diverse piles. A C/N ratio between 27-30 was obtained by mixing the organic waste with bulking agents. Diethyl ether (DEE) and chloroform ($CHCl_3$) extractable lipids have been evaluated and compared to other parameters commonly utilized to study compost stability and maturity (organic carbon, total and inorganic N, $CO_2$ evolution rate, microbial biomass C, phytotoxicity test, humic-like acid characterization), since as usually observed, maturity is better described by different compost parameters, both of chemical and microbiological origin. Results suggested none of these parameters may exhaustively describe maturity of composts studied.

# 57. COMPOSTS AND FORESTRY iNDUSTRY WASTES AS GREENHOUSE GROWTH MEDIA

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The horticulture industry is looking for alternatives to peat based greenhouse growth media due to its decreasing availability and the environmental implications of peat harvesting. Combinations of composts and forestry industry wastes were evaluated as potential sources of peat replacement in greenhouse growth media. The performance of 21 blends; obtained from 4 different types of compost, 2 types of wood wastes, peat, and perlite; with or without chemical fertilizer were compared against Promix®, a commercial peat moss substrate, on tomato (Solanum lycopersicum var. Scotia) seedling growth and nutrient content. The experiment was conducted at the greenhouse of the Nova Scotia Agricultural College, Truro NS, Canada during 2011 and consisted of a split-plot design with four replications. Growth media blend comprised the main plots while supllemental soluble NPK fertilizer (+/-) comprised the suplots. The physical and chemical properties of the raw materials used as well as all blends were analyzed. After 4 weeks of growth, the tomato seedlings were harvested and shoot height, leaf number, and biomass of roots and shoots were recorded. Nitrogen and carbon content of tomato shoots and roots were analyzed. Significant interactions between blend and fertilizer were found with respect to shoot and root biomass ($p=0.0010$). Fertilizer addition increased shoot and root biomass ($p<0.0001$), but blends containing fresh softwood waste did not respond as strongly to fertilizer addition. The N content of tomato roots ($p=00160$) was also significantly affected by the fertilizer and blend interaction. Tomato plants grown in blends with wood wastes had lower root N compared to other blends in the fertilizer treatment. The results suggest that adding wood wastes to growth media as a peat substitute may divert nutrients away from the plant, but the testing of different amounts and types of wood waste may lead to a suitable peat substitute.

## 58. $CO_2$-ENRICHED MICROENVIRONMENT INDUCES BIOSYNTHESIS OF ANTHRAQUINONES, PHENOLICS AND FLAVONOIDS IN BIOREACTOR CELL SUSPENSION CULTURES OF *Morinda citrifolia* (l.): THE ROLE OF ANTIOXIDANTS AND ENZYMES

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In this study, the effects of carbon dioxide ($CO_2$) levels within the range of 0.03-5% on growth and secondary metabolites production, e.g. anthraquinones (AQ), total phenolics and flavonoids in cell suspension cultures of *Morinda citrifolia* were investigated in a 3L balloon-type bubble bioreactor. Besides, 1, 1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging activity, oxidative stress levels, antioxidative responses and enzymatic activities were also estimated. Results revealed that 0.5% and 1% $CO_2$ supply enhanced accumulation of cell biomass, whereas high $CO_2$ levels of 2.5% and 5% uplifted biosynthesis of secondary metabolites in expense of cell growth. In spite of high cell growth at 0.5% and 1% $CO_2$ supply, the maximum yield of AQ (117.24 mg $l^{-1}$ dry weight), phenolics (147.84 mg $l^{-1}$ dry weight) and flavonoids (68.20 mg $l^{-1}$ dry weight) were achieved at 2.5% $CO_2$-treated cultures. This may be due to

enhanced activities of shikimate dehydrogenase (SKDH, E.C. 1.1.1.25), phenylalanine ammonia lyase (PAL, E.C. 4.3.1.5) and cinnamyl alcohol dehydrogenase (CAD, E.C. 1.1.1.195) that stimulated biosynthesis of those metabolites. Cell suspensions cultured with high $CO_2$ progressively stimulated the activity of superoxide dismutase (SOD). Although, catalase (CAT) and guaiacol peroxidase (G-POD) activities were upregulated with $CO_2$ supply, high accumulation of hydrogen peroxide ($H_2O_2$) and peroxidation of lipid (MDA) was induced. These results suggest that the observed high activities of CAT and G-POD were not sufficient enough to cope with toxic $H_2O_2$ accumulation, but played a prominent role in reducing stress severity and thereby allowing cell to grow at elevated levels of $CO_2$.

Keywords: antioxidant enzyme, carbon dioxide, cell suspension culture, *Morinda citrifolia*, oxidative stress, phenylalanine ammonia lyase, secondary metabolite

## 59. EFFECTS OF SOWING TIME AND VARIETY ON kENAF (*Hibiscus cannabinus* L.) SEED PRODUCTION

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An experiment was conducted at the Jute Research Regional Station, Rangpur of Bangladesh Jute Research Institute during the period of 2008-09 and 2009-2010 to study the influence of variety and date of sowing on seed production of kenaf in off season (August-January). The treatments comprised of three varieties HC-2, HC-95 and Kenaf-3 and three dates (15 August, 30 August and 15 September) of sowing in 2008-09 and four dates (1 August, 15 August, 30 August and 15 September) of sowing in 2009-10 at 15 days interval. The treatment was laid out in randomized complete block design (RCBD) with three replications. The seed yield of kenaf was varied significantly due to different dates of sowing and variety. Results showed that highest seed yield was observed in 30 August sowing in both the year. Among the three tested variety of kenaf significantly highest seed yield (840 kg and 1180 kg $ha^{-1}$) was recorded in HC-2.

## 60. AGRONOMIC OPTIONS FOR ENHANCING SYSTEM PRODUCTIVITY OF T. AMAN-FALLOW-SESAME CROPPING SEQUENCE IN THE SALINE SOILS

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Transplanted Aman rice followed by sesame is one of the major cropping sequences in the medium saline, irrigation water lacking area of the greater Khulna of Bangladesh which requires suitable varieties of rice and sesame and alternate tillage options for increasing the system productivity and to cope with weather uncertainty. A study was conducted to identify the combination of rice and sesame varieties and alternate tillage option at Hetalbunia village under Batiaghata Upazila of Khulna district during July 2011-April 2012. Rice varieties, BR23 and BRRI dhan41 and sesame varieties, BARI til3, BARI til4, BINA til1 and BINA til2 with reduced tillage were evaluated and compared with existing varieties and conventional tillage system. Results indicated that aman varieties BR23 or BRRI dhan41 rice followed by either BINA til2 or existing sesame enhanced the system productivity. BINA til2 and reduced tillage

optimized the suboptimal plant population of the existing system and thus increased the system productivity. The adoption of salt tolerant rice varieties, BR23 and BRRI dhan41 and sesame variety BINAtil2 and reduced tillage in sesame by the power tiller operated seeder could be scaled out in the medium saline and irrigation water lacking area.

**Key words:** Rice and sesame variety, tillage, Rice-sesame cropping sequence, system productivity

## 61. EFFECT OF TILLER SEPARATION ON NEW AREA COVERAGE AND YIELD OF BORO RICE

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Seedling scarcity in Boro season is common phenomena in northern parts of Bangladesh. We conducted two experiments to determine the potentiality of separated tiller for new area coverage as well as yield of Boro rice. The experiments were executed in the research field of Bangladesh Rice Research Institute, Gazipur during Boro season in 2011 and 2012. We selected four planting time at 15 days intervals starting from 15th December to 30$^{th}$ January and tillers were separated at forty days after transplanting (DAT). We followed split-plot design putting planting time in main plot and tiller separation in sub plot. About 3-4 times more area was covered with the tillers obtaining from 15 December and 30 January planting at 40 DAT. Transplanting at 15 January produced lower tillers during tiller separation. Growth duration of tiller splitted plot was higher than undisturbed plots and decreases with the advancement of transplanting dates. Grain yield was higher in undisturbed plot followed by disturbed plot. Splitted tillers might an alternative source of seedling during seedling scarcity and maximum new area coverage as well as satisfactory grain yield from splitted tillers transplantation was obtained from 30 January transplanting.

## 62. SCOPE OF GROWING FOUR CROPS IN THE EXISTING RICE BASED CROPPING SYSTEM

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The experiment was conducted at the research field of ORC, BARI Joydebpur (AEZ 28) during 2011-2012 (July 2011 through July 2012) to increase cropping intensity and productivity in existing rice based cropping system for sustaining food security, poverty reduction, resource management and livelihood improvement of ever increasing populations. Four treatments of cropping sequence such as CP1 = T. Aman – Mustard – Boro – T. Aus; $CP_2$ = T. Aman – Potato – Boro –T. Aus; $CP_3$ = T. Aman – Mustard – Mungbean –T. Aus and $CP_4$ = T. Aman – Fallow – Boro – Fallow were tested in a RCB design with five replications. It was observed that intensification of 4 crops in T. Aman – Fallow – Boro – Fallow ($CP_4$) cropping pattern have successfully been adjusted in a calendar year. The highest rice equivalent yield (REY) (30.75 t/ha) was recorded from the cropping sequence T. aman – Potato – Boro – T.aus followed by T. aman – Mustard – Boro – T. aus (20.79 t/ha). The lowest REY (13.46 t/ha) was obtained from the cropping sequence T. aman – Fallow – Boro – Fallow. Inclusion of mustard

during rabi season in $CP_1$ and $CP_3$ increased REY 37 to 54% compared to farmer's pattern $CP_4$. On the other hand, inclusion of potato in $CP_2$ increased REY 128%.From one year study it was observed that highest total productivity, gross return and gross margin was obtained from T. aman – Potato – Boro – T.aus cropping pattern. T.aman – Mustard – Mungbean – T.aus cropping pattern gave the highest profitability interns of MBCR.

## 63. EFFECTS OF PUDDLING INTENSITY AND NITROGEN ON PRODUCTIVITY OF POST-RICE MUNGBEAN

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The study was conducted at the Field Research Site of Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Gazipur from September 2009 to November 2009 to evaluate the effects of puddling intensity and nitrogen on soil characteristics, and plant growth and yield of mungbean. Two mungbean genotypes (BARImung 5 and VC3950-88), two puddling situations i.e. puddling by four passes and puddling by eight passes with no puddling and two nitrogen levels i.e. low (30 kg/ha) and high (50 kg/ha) were the treatment variables. Results showed that soil strength and bulk density increased with the increase in puddling intensity. Puddling impaired root growth resulting to reduced dry matter production. BARImung 5 preformed better in differential puddling intensity and gave higher root dry matter for high N dose. The number of pods per plant reduced 15 and 30% for puddling by 4 and 8- passes resulting to produce 36 and 15% less seed yield, respectively. High N dose significantly increased the number of pods per plant and seeds per pod. The two genotypes differed in producing the number of pods per plant, the number of seeds per pod and seed weight. There was significant positive relationship between the root dry matter and the total dry matter which eventually had positive relationship with the seed yield in both the genotypes. The surface and sub-surface soil strength had strong negative relationship with the seed yield at early stage of crop growth. Bulk density of soil had significant strong negative relationship with the seed yield. Detailed studies applying other management practices are needed to address the problem of puddled soil.

## 64. ANALYSIS OF LAND USE CHANGE IN THE COASTAL AREA OF BANGLADESH USING lANDSAT IMAGERY

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We applied a remote-sensing method to envisage agricultural resources availability trend including water, cropland, forest, shrimp area and to quantify the conversion between the above resources under three major Agro-ecological zones (AEZ) during the period 1989 to 2010 in the coastal area of Bangladesh. The spatial and temporal variability of the above resources were assessed from Landsat imagery having 30m resolution. Image projection, geometric correction and reflectance analysis were performed as preprocessing for image classification. In the

Chittagong Coastal Plains (AEZ 23), the cropland decreased from 48.7% to 19.5% and shrimp-saltbed area increased from 14.3% to 44.9% during 1989-2010. The conversion of cropland to shrimp and salt-bed area was much rapid during the period 2000 to 2010 compared to 1989 to 2000. In the Meghna Estuarine floodplain (AEZ 18), sedimentation and river erosion processes greatly changed the land quality and land uses. The change occurs primarily from mud area to single cropped area showing 49.9% during 1989 to 2000 and 48.9% from 2000 to 2010. In Ganges Tidal Floodplain (AEZ 13) of Barisal region, the conversion of agricultural land to other categories is not remarkable. However, a rapid increase in shrimp cultivation has been observed in Khulna region. About 28.5% double cropped and 30.4% single cropped areas have been converted to shrimp area from 1989 to 2000. Similar to the AEZ 23, such conversion was much higher during 2000 to 2010 showing 50.2% and 37.6%, respectively. The study was carried out taking into account one and/or two sample area from each AEZ. A very comprehensive study is required to get the real picture and relevant information about the whole coastal region for formulating agro-ecosystem management strategy.

## 65. SCREENING OF SOYBEAN VARIETIES / ADVANCED LINES AGAINST SALINITY

**Ferdousi Begum, Abdul Aziz, Pryanka Roy and M.Alam**
Bangladesh Agricultural Research Institute, Gazipur

The experiment was conducted during the kharif 1 season of 2012 at Oilseed Research Centre, Bangladesh Agricultural Research Institute, Gazipur to select salt tolerant soybean genotypes. Forty nine genotypes of soybean were tested during germination and seedling stage at 0, 4, 8 and 12 ds/m salinity levels in Hogland solution culture following CRD design with 3 replications. Germination percentage (GP), root length (RL), shoot length (SL), vigour index (VI) and total dry matter (TDM) were adversely affected by salinity. Germination, seedling height, root length, dry weight of shoot and root were significantly decreased at higher salinity level (12ds/m). The genotypes Gc-83005, F-83-11347, MTD-16, KANH-3, BS-13, Joyawaza, BHOS-5, GMTD-17 and BD2340 performed better at 12 ds/m and survived up to 15 days after germination as evaluated on the basis of tested characters. It might be concluded that the genotypes could be selected for further investigation under pot culture to develop salt tolerant soybean variety.

## 66. YIELD AND QUALITY PERFORMANCE OF RAPESEED – MUSTARD GENOTYPES UNDER LATE SOWN CONDITION

**Ferdousi Begum, Abdul Aziz and Pryanka Roy**
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A field experiment was conducted at the Central Research Station of BARI, Joydebpur, Gazipur during the rabi season of 2011-12 with 30 varieties/ genotypes of rapeseed-mustard under three dates of sowing viz. 25 November, 5 December and 15 December to determine changes in crop phenology, growth and yield of mustard genotypes under late sown condition when the crop faced high temperature. Days to flowering and maturity were different at the different planting time. Effect of variety and sowing date significantly influenced on plant height, number of siliquae per plant, 1000-seed weight, seed yield and oil content of seed. The

highest seed yield (1825 kg/ha) was recorded from BARI Sarisha-16 at 25 November planting which was statistically identical to BJDH-11, BJDH-12, BJDH-05, BJDH-20 and BARI Sarisha-6 and significantly different from all other varieties. On two years average BJDH-11 produced the highest yield at 5 December and 15 December. It might be concluded that BJDH-11 would be selected as heat tolerant genotype for cultivation under late sown condition.

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