

# **PRECISION FARMING CONCEPTS, ISSUES & COMPONENTS**

# WHAT IS PRECISION FARMING?

- Precision Farming or Precision Agriculture is a concept of using the new technologies and collected field information, doing the **right thing, in the right place, at the right time**. Collected information may be used to more precisely evaluate optimum sowing density, estimate fertilizers and other input needs, and to more accurately predict crop yields.
- It helps in avoiding unwanted practices to a crop, regardless of local soil/climate conditions, i.e., it reduces labour, water, inputs such as fertilizers, pesticides etc. and assures quality produce.

# PRECISION FARMING (Definition)

- It is a new method of farming that tailors inputs of fertilizers, pesticides etc. to match the variation in the growing conditions within a field. The practice is known as **Site Specific Management**.
- In other words it is “**Digital Agriculture**” involving very large scale farm level mapping, comprehensive database creation on required resources generated through space based inputs and field observations and making a detailed plan of work for maximizing the yield and reducing the cost on inputs using Decision Support System

# Traditional Farming v/s Precision Farming

Underlying concept of PF

“doing the right thing, at the right time, in the right place, in the right way”

What ? When? Where? How to do?

# *Tools for Precision Farming*

Computers

Global Positioning System (GPS)

Geographic information System (GIS)

Sensors

Application control

# *Precision Farming Includes*

Land preparation

Inputs (seed, planting material, fertilizer etc.)

Irrigation

Plant protection

Harvesting

Post harvesting

Storage

Transportation (cool chain systems)

# Components of Precision Farming

1. **Crop Characteristics** : Stage of crop, crop health, nutrient requirements etc
2. Detailed **soil layer** with physical and chemical properties, depth, texture, nutrient status, salinity and toxicity, soil temperature, productivity potential etc.
3. **Micro-climate data** (seasonal and daily) about crop canopy temperature, wind direction and speed, humidity etc.
4. Surface and sub-surface **drainage** conditions
5. **Irrigation facilities**, water availability, and other planning inputs of interest
- 6. **Farm machinery and Equipment** equipped with sensors

# BENEFITS

- Precision farming not only is potentially more economical, but it also reduces the amounts of chemicals released into the environment.
- **Other benefits:**
- **Improves crop yield & profit**
- **Provides better information for making management decision**
- **Provides more details & useful farm records**
- **Reduces fertilizer costs**
- **Reduces pesticide costs**
- **Reduces pollution**



# Precision farming Models ensure.....

- 40 to 60 % higher yield
- 90% plus first grade marketable produce
- Weight by volume is 25% higher
- 30% premium price in the market
- 5-6 days more shelf life
- Less labour dependence
- 30-40 % Water economy
- Extended crop harvest
- Empowerment of farmers

# PRECISION FARMING AND ITS OBJECTIVES

- **Precision farming aims at improving crop performance and environmental quality. Thus, the concepts of PF include:**
  - **Variation occur in crop or soil properties within a field.**
  - **These variations are noted and often mapped.**
  - **Management actions are taken as a consequence of the spatial variability within the field**

**Variable Rate Application Technology (VRT).**

## **NEED FOR PRECISION FARMING**

### **1. Fatigue of Green Revolution**

- **Poor crop yields**
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### **2. Natural resources degradation**

- **Healthy Land and quality water, both are becoming a limitation to agricultural productivity**

# BASIC STEPS IN PRECISION FARMING

- 1. Assessing variation**
- 2. Managing variation and**
- 3. Evaluation**

**There are three important issues regarding precision agriculture evaluation:**

- **Economics**
- **Environment and**
- **Technology transfer**

# COMPONENTS OF PRECISION FARMING

- **PF has three components:**
  - **Capture of data at an appropriate scale and frequency**
  - **Interpretation and analysis of the data and**
  - **Implementation of management response at an appropriate scale and time**

# CRITICAL ISSUES BEFORE ADOPTION OF PRECISION FARMING

- **There are three critical questions those must be addressed to help determine the potential for PF to be successfully and profitably implemented:**
  - **How much do measured soil and crop characteristic vary?**
  - **How much does the variation affects crop yield and/or crop quality?**
  - **Can the farmer get enough information and the right technologies to profitably manage the variability?**

# ELEMENTS IN PRECISION FARMING

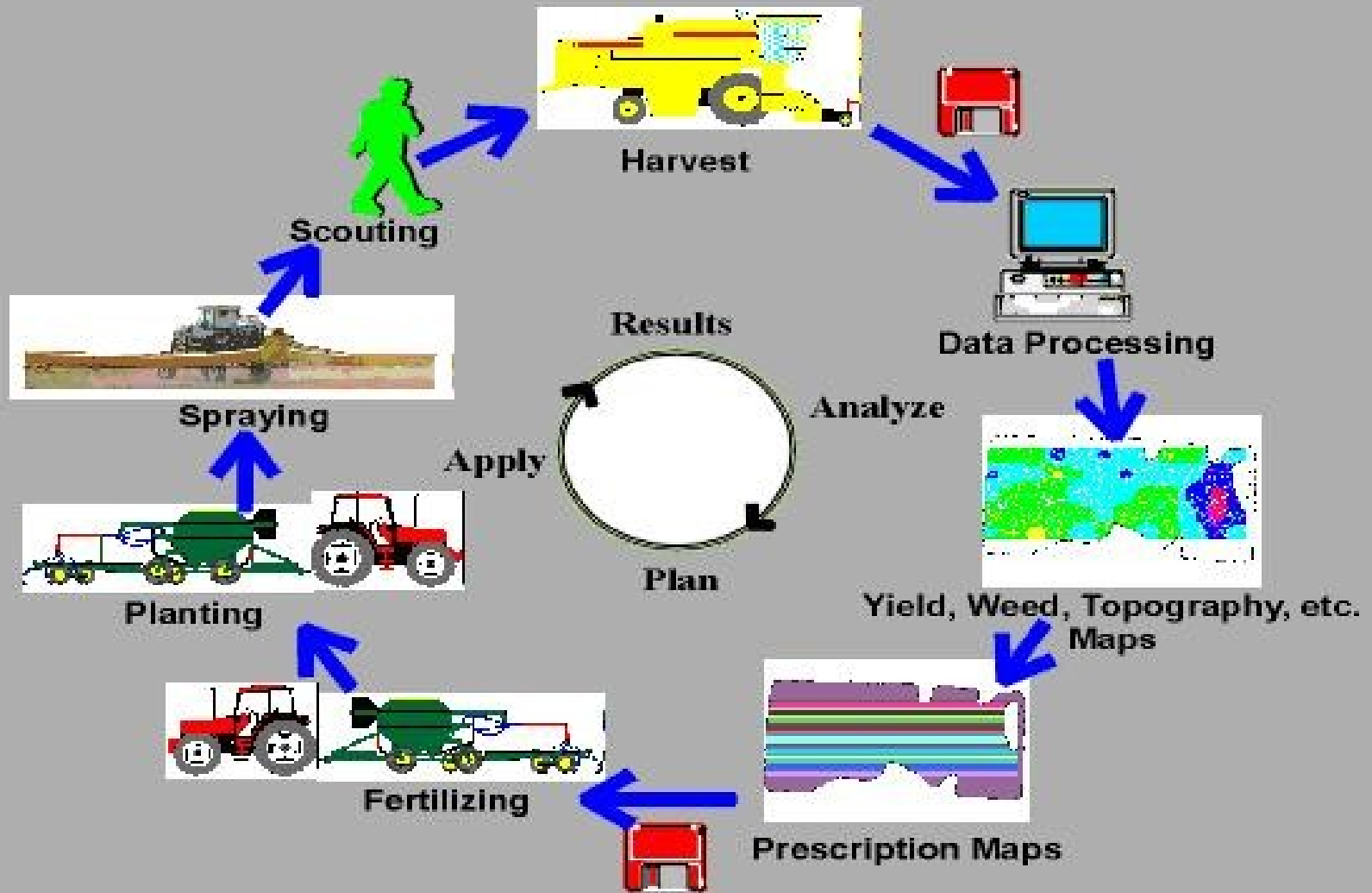
• **PF relies on the interaction of three broad and fundamental elements to be successful in its implemented:**

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**1. Information**

**2. Technology**

**3. Management**



## Precision Farming Cycle



# TOOLS FOR PRECISION FARMING

- 1. Remote Sensing**
- 2. Crop Acreage and Production Estimates**
- 3. Forecasting Agricultural Output using Space, Agrometeorology, and Land Based Observations (FASAL)**
- 4. National Agricultural Drought Assessment and Management Systems (NADAMS)**
- 5. Geographical Information System**
- 6. Geographical Positioning System : will provide automated facilities for farm operations like tillage, planting, fertilizer applications, pesticide sprays, irrigation, harvesting etc. DEM may work**

# MIS-CONCEPTIONS

- **Precision agriculture is a cropping rather than an agricultural concept**
- **Precision agriculture in cropping equals yield mapping**
- **Precision agriculture equals sustainable agriculture**

# OBSTACLES

- 1. Culture and perceptions of the users**
- 2. Small farm size**
- 3. Lack of success stories**
- 4. Heterogeneity of cropping systems and market imperfections**
- 5. Land ownerships, infrastructure and institutional constraints**
- 6. Lack of local technical expertise**
- 7. Knowledge and technical gaps**
- 8. Data availability, quality and costs**

# GETTING STARTED

- **PF is not appropriate for every field. To determine specific field will benefits from PF, use the following steps:**
  - **Review current data**
  - **Obtain additional data**
  - **Gather yield data**
  - **Examine results**
  - **Data interpretation**
  - **Management strategy**

# SCOPE OF PRECISION FARMING

- In cultivation of

- High Value / Commercial / Fruits  
/ Flowers / Vegetables



# Can We Transform Agriculture... ?

- **From Productive to Profitable Agriculture**
  - **From Sustainable to Competitive Agriculture**
  - **From Production Driven to Market Driven**
  - **From Localized to Globalized Agriculture**
- **Yes, Through Precision Farming**