

## Precision Agriculture-A Boon to Sustainable Agriculture

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### **Introduction-**

Our ancestral teaching involves one of the usual statements- “We should always eat according to the stomach needs” the same idea lies with the agricultural management practices too. This simple concept laid the foundation of precision agriculture, which is one of the major concerns globally among the scientists and farmers.

Precision Agriculture can be simply defined as “Doing right thing at right place and right time”. We can also say that feed the plant and soil in the optimal quantity based on the actual requirement. Precision agriculture includes precise and accurate practices in every farming factor from sowing to harvesting. Indian concept of PA relies on the accurate application of inputs for crop growth considering the various factors affecting the crop vitality.

Precision agriculture plays an integral role towards the encouragement of sustainable agriculture which as of now is a serious concern for the global perpetuation. In precision agriculture the soil management, tillage practices, water management, nutrient management, plant protection practices are totally particular plant or individual plot’s need driven which leads to the judicious use of input resources and discourages the irrational use (which is the property of conventional agriculture). Hence optimising the resource utilisation to protect it for the future requirements and as a result of it, the health of ecosystem gets ameliorated. It’s a growing concept and various research works have been conducted and still going under the heads—enhancement of grain quality, maintaining the soil health, soil biota, weed management, irrigation management, drainage practices, pest management, monitoring the crop yield.

### **Agriculture System Can Be Used For-**

- Land preparation

- Seeding
- Chemical application
- Fertilizer application
- Crop monitoring
- Nutrient auditing
- Soil and leaf testing
- Pest management
- Conservation practices
- Gross margin analysis

### History of Precision Farming-

- 1950-1960 - Launch of satellites, GPS, GIS
- 1980- 1990 - Began to be widely adopted by the farmers
- 2000 onwards – Sensors and drones

Precision agriculture includes some integral components which are- Remote sensing, global positioning system (GPS), geographical indication system (GIS) Variable rate technologies (VRT), drones and sensors, digital soil mapping (DSM), LCC, SPAD and green seekers. All these components revolve around the adoption of precision agriculture (PA) and management of input resources precisely.

✚ **Remote Sensing System-** It is the unique capability of data recording and its analysis in both visible and invisible (including ultraviolet, reflected infrared, thermal infrared and microwave) parts of electromagnetic radiations. This technology enables us to evaluate the phenomena which is beyond the capacity of human eye. It is applicable for crop survey, range survey, livestock survey. There are three remote sensing platforms and sensors- Ground based platforms, airborne platforms and space borne platforms.

✚ **Global Positioning System-** It is the navigation system that works upon the latitudes, longitudes and elevation with accuracy between 100-0.01m. It helps farmers for field monitoring, field mapping, soil mapping, pest occurrence, weed infestation, water holes, boundaries and obstructions. The estimation is totally satellite based (revolving in the orbits) and the imageries obtained.

- ✚ **Geographic Information System-** This system is the amalgamated working of hardware and software which are oriented for the compilation, storage, retrieval and analysis of feature attributes. It generates the digital maps which are very much different from conventional maps and contains various layers of information. GIS can be used for assessing- field topography, soil types, surface drainage, sub surface drainage, irrigation, chemical application rates and crop yield estimation.
- ✚ **Digital Soil Mapping-** Computer assisted production of digital maps of soil types and properties by use of maths and statistical models that combine information from soil observations with information contained in explanatory environment variables.
- ✚ **Variabile Rate Technology-** VRT allows fertilizer, chemicals, lime, gypsum, irrigation water and other farm inputs to be applied at different rates across a field, without manually changing rate settings on equipment or having to make multiple passes over an area. There are two kinds of variability's assessed i.e., spatial variability and temporal variability.
- ✚ **Leaf Colour Chart (LCC)-** The Leaf Color Chart (LCC) is used to determine the N fertilizer needs of rice crops. LCC has four green strips, with colour ranging from yellow green to dark green. It determines the greenness of the rice leaf, which indicates its N content.

### **Conclusion-**

The fast pace of the global population increments and their nutritional demand, both qualitatively and quantitatively is posing a serious detrimental effect on the health of ecosystem. This will not leave the natural resources' pool for our future generation and to conserve it is our whole and sole responsibility. Hence to cope up with it, the only ideology on which we can rely on is-"Sustainable Agricultural Development". To fuel it, precision agriculture system is the key.

Present scenarios regarding precision agriculture involves various technological innovations and conceptual evolutions which is combating the haphazard of conventional agriculture. Agriculture scientists are in continuous way for more advancement in this field that should go collaterally with the environmental issues. Adoption of precision agriculture and its components is still not economically feasible by any farmers of India due to maximum



coverage of marginal farmers. Till date there are many achievements gained and still many more are on its way. Adoption of these practices and concepts are really a boon to the farming system and allied sectors. Precision agriculture has increased the global food production both qualitatively and quantitatively and this arena still requires the mass acceptability among the farmers which can be facilitated by the approachable extension activities.

#### References-

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