

# PRECISION AGRICULTURE: A PROGRESSION FOR SUSTAINABLE PRODUCTION



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## INTRODUCTION:

Precision Agriculture is the application of technologies and principles to manage spatial and temporal variability associated with all aspects of agricultural production for improving production and environmental quality. Precision Agriculture is a new concept adopted throughout the world to increase production, reduce labor, time, and ensure the effective management of fertilizers and irrigation processes. It uses a large amount of data and information to improve the use of agricultural resources, yields, and the quality of crops. The success in precision agriculture depends on the accurate assessment of the variability, its management and evaluation in space-time continuum in crop production.

## TECHNOLOGIES USED IN PRECISION AGRICULTURE

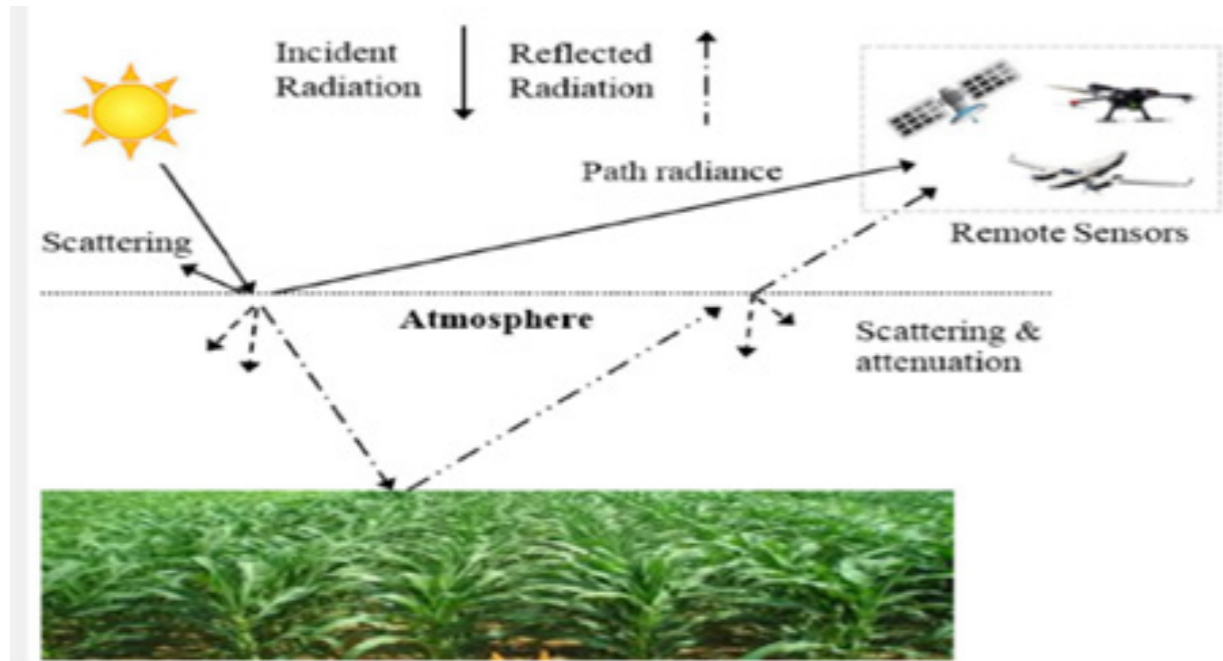
- ✓ Remote sensing
- ✓ Global positioning system (GPS)
- ✓ Geographical information system (GIS)
- ✓ Variable rate applicator (VRT)

## SCOPE OF PRECISION AGRICULTURE IN INDIA

Today, the conventional method of farming is less profitable in India. Low fertility of soils and increased farming cost and makes farming very difficult and low profitable. Precision farming can overcome these difficulties. Many new generation farmers got great results by adopting precision farming techniques. Reducing the wastage of resources and increasing the efficiency of farming can help farmers to get more revenue. Cost of implementing precision agriculture is high, if we consider the benefits and profits, it is cost effective. States such as Punjab and Haryana have experienced large-scale mechanization as well as high doses of fertilizers and pesticides. The state of Punjab has 1.5% of the total geographical area of India, but uses 1.41 million tonnes (nearly 7% of all India fertilizer consumption) of NPK fertilizer along with 60% of herbicides used in India. Over exploitation of land and excessive use of agricultural input are typical problems of these areas. The signs of tiredness in the natural resources are already visible in these areas.

# REMOTE SENSING:

It is process of collecting information about any object from the distance on basis of spectral signature/ spectral reflectance or thermal reflectance properties of soils and crops. This technique is used for crop production forecasting, land use or cover mapping, soil and waste land mapping, drought monitoring, surface water bodies and ground water exploitation monitoring.



## GLOBAL POSITIONING SYSTEM

It is key technology to achieve accuracy when driving in the field and providing navigation capability anywhere on earth anytime. This system record the position of the field using geographic coordinates (latitude and longitude).GPS satellites broadcast signals that allow GPS receivers to compute their location.Locate the exact position of field information such as soil type, pest occurrence, weed invasion, water holes, boundaries and obstructions.

## GLOBAL INFORMATION SYSTEM

GIS is computerized data storage and retrieval system. It can be used to manage and analyse spatial data relating soil fertility pattern, correlations between yield and other growth limiting factors. GIS can display analysed information in maps. Maps allow the better understanding of interactions among yield, scheduling of irrigation, weed control, pest control, decision making and drought monitoring. Automatic UAV-based detection helps in saving herbicide in vineyards.

# PRECISION AGRICULTURE



## VARIABLE RATE TECHNOLOGY (VRT):

Variable rate technology consists of farm equipment with the ability to precisely control the rate of application of crop inputs. The map-based VRT systems require a GPS/DGPS geo-referenced location. The sensor-based VRT systems do not require a geo-referenced location but include a dynamic control unit, which specifies application through real time analysis of soil and crop sensor measurements for each field location.

## NUTRIENT MANAGEMENT TOOLS:

There are number of tools for nutrient management viz., Optical sensors, Green seekers SPAD chlorophyll meter and Leaf colour chart.

Leaf colour chart rapidly assess leaf N status at crop growth stages and thereby guide the application of fertilizer N to maintain optimal leaf N content. Effect of leaf colour chart (LCC) based real time N management which increases protein content of rice. STCR based integrated fertilizer use on pearl millet (*Pennisetum glaucum*)-wheat (*Triticum aestivum*) cropping system in semi-arid condition of India results in increases grain and straw yield of peral millet and wheat.