

PRECISION AGRICULTURE¹Deepshikha, SVPUAT, Meerut²Amit Kumar, BUAT, Banda³Balveer Gautam, ANDUAT, Kumarganj, Ayodhya⁴Akanksha, CSUAT, Kanpur, U.P.**ARTICLE ID: 35****Introduction**

Precision agriculture, sometimes called site-specific management, is an emerging technology that allows for adjustments to address within-field variability in characteristics such as soil fertility, soil moisture, weed intensity and insect-pest infestation. The technology has the potential to reduce production costs through more efficient and effective application of crop inputs. Precision agriculture merges the new technologies borne of the information age with mature agriculture industry. It is an integrated crop management system that attempts to match the kind and amount of inputs with the actual crop needs for small areas within a farm field. This goal is not new, but new technologies now available allow the concept of precision agriculture to be realized in a practical production setting. Precision agriculture is a system approach to farming. To be viable, both economic and environmental benefits must be considered, as well as the practical questions of field-level management and the needed alliances to provide the infrastructure for technologies. The issues surrounding precision agriculture include perceived benefit and barriers to widespread adoption of precision agriculture management.

Definition

The word 'precision' means exactness or accuracy precision agriculture is a management strategy that gathers, processes and analyses temporal, spatial and individual data and combines it with other information to support management decisions according to estimated variability for improved resource use efficiency, productivity, quality, profitability, and sustainability of agricultural production.

A management practice applied at the right rate, time, and right place such as customized field management, nutrient, irrigation, insect and weed, tillage and seedling operations. It helps in avoiding unwanted practice 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



Benefits

Optimising production efficiency – The identification of variability in yield potential may offer possibilities to optimise production quantity at each site or within each zone using differential management.

Optimising quality – With the advancement of technology, focus on optimising quality of yield is possible. Nutrient management and soil management can produce yield of high quality.

Minimising environmental impact – Pesticide application, using principles of integrated pest management (IPM), has the potential to minimise environmental impact by reduce pesticide usage.

Pest populations are mapped and prescriptions determined. Rate information is sent to the control system and the sprayer responds by changing application rates.

- Improves crop yield & profit.
- Provides better information for making management decision.
- Provides more details & useful farm records.
- Reduces fertilizer costs.
- Reduce pesticide costs.
- Reduce pollution.

Tools for precision agriculture: Precision agriculture is a combination of application of different technologies. All these combinations are mutually inter related and responsible for developments. The same are discussed below:

Global positioning system (GPS): It is a set of 24 satellites in the earth orbit. It sends out radio signals that can be processed by a ground receiver to determine the geographic position on earth. It has a 95% probability that the given position on the earth will be within 10-15 meters of the actual position.

Geographic information system (GIS): It is software that imports, exports and processes www.justagriculture.in

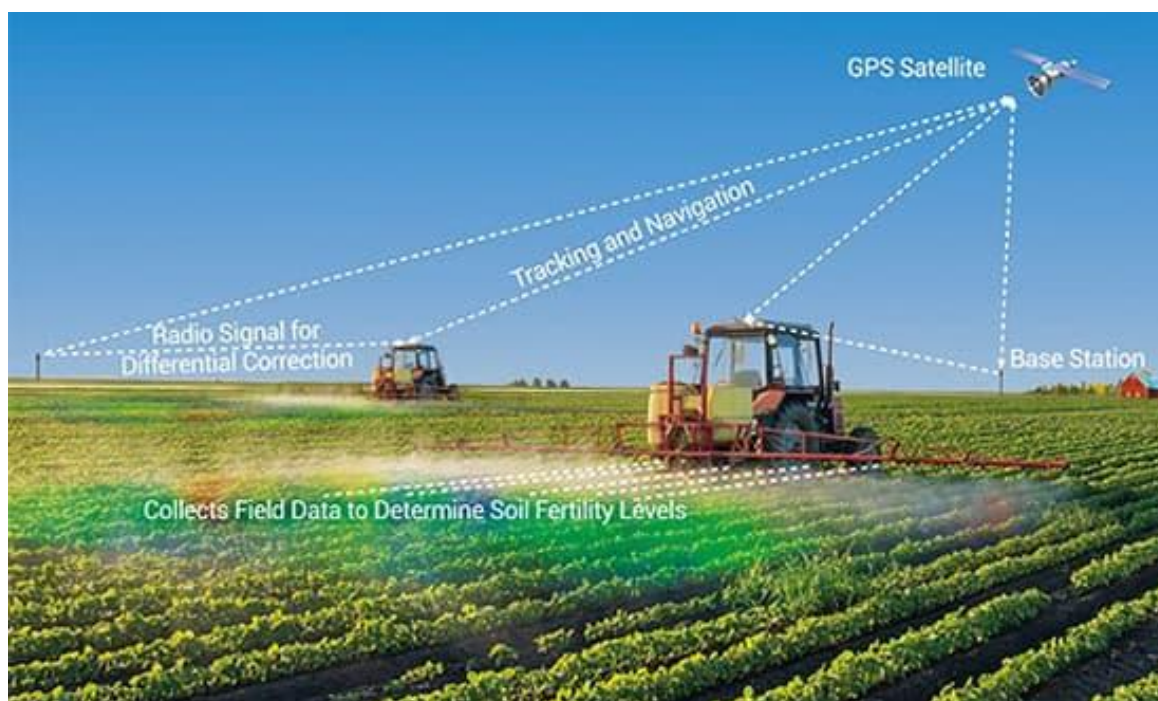
spatially and temporally geographically distributed data.

Grid sampling: Grid sampling is a type of process that involves breaking a field into different smaller blocks. Then the soil is sampled within these grids to precise and proper application rates.

Remote sensors: These remote sensors mainly indicate variation in the field colour which corresponds to changes in soil structure and type, crop growth, animal condition, and field boundaries. The remote sensed images can then be used to develop and implement a spot treatment plan that optimizes the use of agriculture chemicals.

Crop production forecasting: it mainly includes the identification of crops, acreage estimation, and yield forecasting.

Precision Irrigation: Waterland means salt affected areas, acidic soils, eroded soils, waterlogged areas, and dryland etc.



Advantages of precision agriculture

- Increases return-on-investment by reducing inputs use and increasing yield amounts and quality.
- It reduces soil, water, and air pollution by decreasing the use of chemical fertilizers and pesticides.
- Precision farming builds up soil biodiversity and supports wildlife outside farms.
- It makes farming sustainable by reducing reliance on resources and water.
- Precision farming reduces carbon emissions from the agriculture sector.

Limitations

- Technologies, including air frames and software develop very fast sometime user have a difficult time to catch up with these advances.



- Some lighter air frames are still relatively unsteady especially in wind, resulting in poor quality images.
- The biggest issue for growers is what to do with or how to interpret all the data collected.

Conclusion

In the present time of increasing input cost, decreasing commodity prices and environmental concerns, farmers and govt. authorities are looking for new ways to increase efficiency, cut costs and subscribe to sustainable agriculture.

Precision agriculture is a comprehensive system designed to optimize production.

Using the key element of information, technology, and management, precision agriculture can be used to increase production efficiency, improve product quality, improve the efficiency, of crop chemical use, conserve energy, and protect the environment.

Economy and environment benefit of precision agriculture should be brought into the knowledge of the farmers to achieve impact on productivity and profitability.