

Precision Agriculture

January 16, 2021

In News: Market is Forecasted to Reach US\$11.36 Billion in 2024, Growing at a CAGR of 10.9%.

Background

- **By 2050, the number of people on planet Earth is projected to reach 9.8 billion.**
- While the scientific community has begun to view old fears about overpopulation as unfounded, the rapidly expanding human population presents genuine & real-time challenges to economic, agricultural, and communal infrastructures.
- Farmers, especially in the emerging and developing economies like Asia Pacific, Africa and SAARC regions face an ever-growing demand to produce more food on smaller landholdings, even as they struggle to protect their farms against extreme weather, climate change, environmental impact, market fluctuations, etc.
- To inclusively feed this massive population, it is imperative to have transformation in Agriculture with disruptions from next-generation technologies like the Internet of Things, AI, ML, Robotics etc.
- **Precision agriculture techniques can be a game changer.** It can give farmers productive tools to optimize every farming task.

What is precision farming?

- Precision farming **involves efficient management of resources through location specific high tech interventions.**
- These **high tech interventions include fertigation, greenhouse, soil and leaf nutrient based fertiliser management, mulching for moisture conservation, micro-propagation, high density planting, drip irrigation etc.**

- Precision farming uses information based farm management for optimum profitability, sustainability and resource utilization.
- The required information for Precision farming is obtained with the help of technologies like geographic information system (**GIS**), Global Positioning System (**GPS**), remote sensing (**RS**), etc.
- The success of Precision farming relies on the integration of these technologies into a single system that can be operated at farm level with sustainable effort.

About Precision Agriculture

- It is an approach to farm management that uses information technology (IT) to ensure that the crops and soil receive exactly what they need for optimum health and productivity.
- It is an approach where inputs are utilised in precise amounts to get increased average yields, compared to traditional cultivation techniques.
- The goal of PA is to ensure profitability, sustainability and protection of the environment.
- PA is also known as satellite agriculture, as-needed farming and site-specific crop management (SSCM).
- Precision agriculture relies upon specialized equipment, software and IT services.
- The approach includes accessing real-time data about the conditions of the crops, soil and ambient air, along with other relevant information such as hyper-local weather predictions, labor costs and equipment availability.

Significance of precision farming

- Sustainable PA is this century's most valuable innovation in farm management that is based on using Information and Communication Technologies (ICTs).

- This is the most recent innovation technology based on sustainable agriculture and healthy food production and it consists of profitability and increasing production, economic efficiency and the reduction of side effects on the environment.
- Today, farmers really need to take up precision farming due to the following reasons:
 - To increase agriculture productivity
 - Prevents soil degradation
 - Reduction of chemical application in crop production
 - Efficient use of water resources
 - Dissemination of modern farm practices to improve quality, quantity and reduced cost of production
 - Developing favourable attitudes
 - Precision farming changing the socio-economic status of farmers

Precision farming in India

- Some of the schemes like PMKSY (Per Drop More Crop) involve Precision Agriculture practices.
- The Indian Council of Agricultural Research (ICAR) and the Indian Agricultural Research Institute (IARI) has formulated a project entitled "SENSAGRI: SENSOR based Smart AGRiculture".
- The major objective is to develop indigenous prototypes for drone based crop and soil health monitoring systems using hyperspectral remote sensing (HRS) sensors.
- Drone technology is also being used. It has the ability for smooth scouting over farm fields, gathering precise information and transmitting the data on a real time basis.
- Mobile apps are being used to provide farmers with weather information and provide early warning.

Global Positioning System (GPS)

- GPS provides continuous, real-time, 3D positioning and navigation worldwide in any weather condition.
- GPS-based applications in precision farming are being used in farm planning, field mapping, tractor guidance, variable rate applications (automated precise application of pesticides, fertilizers, etc. based on data that is collected by sensors, maps, and GPS) and yield mapping.
- GPS allows farmers to work during low visibility field conditions such as rain, dust, fog, and darkness.

Geographic Information System (GIS)

- The GIS is a computerised data storage and retrieval system, which can be used to manage and analyse spatial data relating crop productivity and agronomic (study of crops and the soils) factors.
- It can integrate all types of information and interface with other decision support tools.
- GIS can display analysed information in maps that allow better understanding of interactions among yield, fertility, pests, weeds and other factors, and decision-making based on such spatial relationships.

Remote Sensing (RS) Technique

- RS is the science of making inferences about material objects from measurements, made at distance, without coming into physical contact with the objects under study.
- The RS system consists of a sensor to collect the radiation and a platform – an aircraft, balloon, rocket, satellite – on which a sensor can be mounted.