Mains Marathon

Day 41: What is Precision Farming? Discuss why do Indian farmers today need to take up precision farming. (150 words)

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Approach / Explaination / Answer

- Define Precision Farming and discuss its significance and technology uses.
- Explain the need of Indian farmers to take up of Precision farming in agriculture.
- Conclude suitably.

Answer:

Precision farming (PF) is an approach where inputs are utilised in precise amounts to get increased average yields, compared to traditional cultivation techniques. Sustainable Precision Farming is this century's most valuable innovation in farm management that is based on using Information and Communication Technologies (ICTs). The goal of PF is to ensure profitability, sustainability and protection of the environment. PF is also known as satellite agriculture, as-needed farming and site-specific crop management (SSCM).

Significance of Precision Farming:

- 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.
- Precision farming is changing the socio-economic status of farmers.

Technology used in Precision Farming:

- Global Positioning System (GPS) receivers
- Differential Global Positioning System (DGPS)
- Geographic information systems (GIS)
- Remote sensing
- Variable Rate Applicator
- Combine harvesters with yield monitors

Drawbacks of Precision Farming:

- High cost
- Lack of technical expertise knowledge and technology
- Not applicable or difficult/costly for small land holdings.

Reasons why Indian Farmers need to take Precision Farming

- To **meet the huge food grain requirement of 480 million tonnes** (Mt) by the year **2050**, with the increasing challenges of biotic and abiotic stresses experienced by crops, introduction and adoption of modern technology in Indian agriculture is inevitable.
- The global food system faces formidable challenges and that will increase over the next 40 years. The decline in the total productivity, diminishing and degrading natural **resources, stagnating farm incomes, lack of eco-regional approach, declining and fragmented land holdings, trade liberalization on agriculture, limited employment opportunities in non-farm sector,** and **global climatic variation have become major concerns in agricultural growth and development**. Therefore, the use of newly emerged technology adoption is seen as one key to increase agriculture productivity in the future.
- It is expected that application of **balanced soft and hard Precision Agriculture (PA) technologies** based on the need of specific socio-economic condition of a country will make PA suitable for developing countries also.
    - **'Soft' PA** depends **mainly on visual observation of crop and soil and management decision** based on experience and intuition, rather than on statistical and scientific analysis.
    - **'Hard' PA** utilizes all modern technologies such **as GPS, Remote Sensing, and VRT (Variable rate technology)**. VRT is the **ability to vary the amount of fertilizer or other farm inputs,** based on variations in the soil or crop.
- Precision farming 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. Predictive analytics software uses the data to provide farmers with **guidance about crop rotation, optimal planting times, harvesting times and soil management**.
- Sensors in fields measure the moisture content and temperature of the soil and surrounding air. Satellites and robotic drones provide **farmers with real-time images of individual plants. Information from those images can be processed and integrated with sensor and other data to yield guidance for immediate and future decisions,** such as precisely what fields to water and when or where to plant a particular crop.
- Agricultural control centers integrate sensor data and imaging input with other data, providing farmers with the ability to identify fields that **require treatment and determine the optimum amount of water, fertilizers and pesticides to apply**. This helps the **farmer avoid wasting resources and prevent run-off,** also **reducing costs and controlling the farm's environmental impact**.
- Today, **Mobile apps, smart sensors, drones and cloud computing makes precision agriculture** possible for farming cooperatives and even small family farms even if they can't support IT infrastructure and resources.

Precision farming in many developing countries including India has numerous opportunities for farmers to identify better high yielding location specific crops and a farmer turns in to a breeder to produce better and higher yielding varieties by using PF system. In the light of today's urgent need, there should be an all-out effort to use new technological inputs to make the **'Green Revolution' an 'Evergreen Revolution'**.