Weed-Induced Crop Losses

For Prelims: kharif crops, rabi crops, Krishi Vigyan Kendras, herbicides, mechanization, weed management, organic and sustainable farming practices, precision agriculture.

For Mains: Weed control strategies and government initiatives to mitigate weed problems.

Source: TH

Why in News?

According to a study by **the Federation of Seed Industry of India (FSII), weeds** are causing Rs 92000 crore (USD 11 billion) worth of **loss in crop productivity each year.**

- The report highlights the need for **technology-led weed control strategies** to mitigate this growing problem.

What are the Key Points of the Study?

- **Yield Loss Statistics:** Weeds account for approximately **25-26%** of yield losses in **kharif crops** and **18-25%** in **rabi crops** across India.
- **Diverse Crops and Regions:** The study covered **seven major crops—rice, wheat, maize, cotton, sugarcane, soybean, and mustard**, across 30 districts in 11 states.
- **Stakeholder Involvement:** Researchers interviewed 3,200 farmers, 300 dealers as well as officials from, **Krishi Vigyan Kendras**, and Agriculture Department.
- **Average Expenditure:**The average weed control expenditure ranges from Rs 3,700 to Rs 7,900 per acre.
- **Weed Management Strategies:** The study recommends herbicides, mechanization, crop rotation, cover cropping, and biological control, which could reduce costs by 40-60% compared to traditional methods.

Federation of Seed Industry of India (FSII)

- FSII is a 40-member association **representing the R&D-driven plant science industry** in India.
- It is involved in the production of high-quality seeds for food, feed, and fibre, supporting the country's agricultural sector.
- FSII promotes the adoption of technology-driven farming solutions that improve agricultural productivity while reducing both pre-harvest and post-harvest losses in a sustainable manner.
- It is affiliated with international bodies like the **International Seed Federation (ISF)** and the **Asia and Pacific Seed Association (APSA)**, enhancing its global outreach and collaboration.

What are Weeds?

- **About:**
  - Weeds are typically unwanted plants that thrive in ecosystems where they disrupt agricultural or ecological balance. Examples include **nut grass, portulaca, common couch, and leucaena**.
- **Characteristics:**
  - They are characterized by their ability to **aggressively compete with cultivated crops** and other vegetation for essential resources.
  - Weeds exhibit significant **resilience and adaptability to diverse environmental conditions,** allowing them to colonize various habitats rapidly.
  - Weeds often grow quickly and reproduce in large numbers, primarily through **seeds, rhizomes, or other vegetative structures**, facilitating their spread.

//

What are the Challenges Posed by Weeds?

- **Reduction in Agricultural Productivity:** Beyond costs, **weeds are a leading cause of crop loss,** competing for resources from the preparatory tillage stage to the post-harvest stage.
    - Weed compete with crops for essential resources such as water, nutrients**, sunlight, and space** which can result in lower yields and reduced crop quality.
- **Increased Farming Costs:** Weed management requires significant investments in terms of **labour, herbicides, and other control methods** which can increase the overall expenses of farming operations.
- **Herbicide Resistance:** Continuous **use of herbicides** has led to the development of herbicide-resistant weed species. This **complicates control efforts and** necessitates the use of alternative or more expensive methods to manage resistant populations.
- **Depletion of Soil Health:** Some weed species can degrade soil quality by **altering its nutrient balance or increasing soil erosion**. Their aggressive root systems may also hinder the growth of other plants, leading to long-term soil degradation.
- **Increased Pest and Disease Risks:** Weeds often serve as hosts for various pests and pathogens, providing **breeding grounds for insects and diseases** that can then spread to nearby crops, further aggravating agricultural challenges.

What are the Benefits of Weed?

- **Habitat and Food for Wildlife:** Weeds provide **habitat and food sources for various insects, birds, and small animals**. They play a role in maintaining biodiversity by supporting ecosystems with secondary species that rely on their presence.
- **Medicinal and Nutritional Uses:** Some weeds have medicinal properties or are used as **natural remedies in traditional medicine.** For example, plants like **dandelion and nettle** are known for their health benefits. Certain weeds are also edible and provide nutrients when used as food.
- **Natural Pollinator Attractants:** Many weeds **produce flowers that attract pollinators such as bees, butterflies, and other beneficial insects.** By supporting pollinator populations, weeds indirectly enhance the productivity of nearby crops and plants.

What are the Challenges in Implementing Effective Weed Management Strategies?

- **Weed Resistance:**
    - Over Reliance on herbicides can lead to the development of herbicide-resistant weed strains, making it more difficult to control them over time.
- **Labor Shortages:**
    - With a declining agricultural labor force and increased rural-to-urban migration, **manual weeding is becoming less feasible.**
- **High Costs:**
    - Although technological solutions like **herbicides and mechanization** can reduce costs, the initial investment for these technologies may be **prohibitive for small-scale farmers.**
- **Environmental and Health Concerns:**
    - The excessive use of chemical herbicides can lead to **environmental degradation, water contamination, and potential health risks** for both farmers and consumers.
- **Integration with Organic and Natural Farming:**
    - There is a challenge in aligning chemical and mechanical **weed management** techniques with **organic and sustainable farming practices**, which aim to minimize external inputs like herbicides.

What are the Government Initiatives Related to Agriculture?

- **Pradhan Mantri Kisan Samman Nidhi (PM-KISAN)**

- **Pradhan Mantri Fasal Bima Yojana (PMFBY)**
- **Pradhan Mantri Krishi Sinchai Yojana (PMKSY)**
- **National Mission on Sustainable Agriculture**
- **Paramparagat Krishi Vikas Yojana (PKVY)**
- **Unified Farmer Service Platform (UFSP)**
- **National e-Governance Plan in Agriculture (NeGP-A)**
- **Mission Organic Value Chain Development for North Eastern Region (MOVCDNER)**

Way Forward

- **Technological Integration:** The study recommends a comprehensive, technology-driven weed management framework to enhance agricultural productivity.For
    - example, **in Direct Seeded Rice (DSR)**, seeds are directly drilled into the fields, which helps conserve groundwater. Similarly, **Zero-Tillage (ZT)** wheat technology involves sowing seeds without disturbing the soil.
- **Public-Private Collaboration:** Experts emphasize the need for **collaboration between the public and private sectors** to tackle weed-related challenges.
- **Innovative Solutions:** Adoption of **herbicide-tolerant traits, and precision agriculture** are seen as key strategies to overcome labour shortages and resource constraints.
- **Crop Rotation:** It is the **practice of growing a series of different types of crops in the same area** across a sequence of growing seasons and can lower weed infestation.
- **Holistic Framework:** According to the Ministry of Agriculture, an **integrated approach combining traditional, mechanical, chemical, and organic farming solutions is critical** for effective weed management.

Drishti Mains Question:

Discuss the major challenges in implementing effective weed management strategies and suggest potential solutions.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims:

Q. Consider the following kinds of organisms: (2012)

1. Bacteria
2. Fungi
3. Flowering plants

Some species of which of the above kinds of organisms are employed as biopesticides?

(a) 1 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

Ans: (d)