

CrackEx Agriculture Optional Notes (WBCS)

Weed – Definition

The term *weed* was first used by **Jethro Tull**. A weed is an unwanted and undesirable plant growing where it is not required. It competes with crop plants for nutrients, water, light, space and carbon dioxide, thereby reducing crop growth and yield. In simple words, a weed is a **plant out of place** that interferes with human activities and agricultural production.

Key Points of Weed

1. **Unwanted plant** (Example: Parthenium in a crop field/Water hyacinth in a fish pond.)
2. **Competes with crops for resources** (Wild oat competes with wheat for nutrients and water.)
3. **Reduces crop yield and quality** (*Phalaris minor* reduces wheat yield.)
4. **Adversely affects human welfare and agricultural production** - Parthenium causes skin allergy and respiratory problems.

One-line definition:

"A weed is any unwanted plant growing where it is not desired and interfering with the objectives of man."

Important Classifications of Weeds

1. Based on Life Cycle:

Annual – *Amaranthus viridis* | Biennial – *Cichorium intybus* | Perennial – *Cyperus rotundus*

2. Based on Cotyledons:

Monocotyledonous – *Phalaris minor* | Dicotyledonous – *Amaranthus viridis*

3. Based on Morphological Characters:

Grasses – *Echinochloa colona* | Sedges – *Cyperus rotundus* | Broad-leaved – *Chenopodium album*

4. Based on Site of Predominance:

Obligate – *Chenopodium album* | Facultative – *Argemone mexicana*

Harmful Effects of Weeds

1. **Reduction in Crop Yield** – Compete with crops for water, nutrients and light.
e.g: Avena fatua in wheat.
2. **Interference with Farm Operations** – Make sowing, intercultural operations and harvesting difficult. *E.g: Dense weeds obstruct harvesting machinery.*
3. **Deterioration of Produce Quality** – Contaminate harvested produce and reduce its quality.
e.g: Datura seeds in food grains.
4. **Harbouring Pests and Diseases** – Act as alternate hosts for pests and pathogens.
e.g: Weeds harbour Fusarium spp.
5. **Health Hazards** – Some weeds are poisonous or cause allergies.
e.g: Parthenium hysterophorus causes dermatitis and allergies.

Beneficial Uses of Weeds

1. **Fodder** – Used as feed for livestock. *e.g: Cynodon dactylon.*
 2. **Food** – Some weeds are consumed as vegetables. *e.g: Chenopodium album (Bathua).*
 3. **Medicinal Uses** – Possess useful medicinal properties. *e.g: Eclipta alba (Bhringraj).*
 4. **Soil Conservation** – Protect the soil from erosion. *e.g: Imperata cylindrica.*
 5. **Crop Improvement** – Provide useful genes for crop breeding. *e.g: Saccharum spontaneum in sugarcane breeding.*
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Characteristics of Weeds

1. Persistence and Hardiness

Weeds are highly persistent and can repeatedly invade an area even after removal. They are hardy enough to withstand drought, flooding, heat, cold and other adverse conditions.

2. Vigorous reproduction

Most weeds produce a very large number of seeds, ensuring their survival and spread. Seed production may vary from **40 to 1,96,000 seeds per plant.**
Example: *Amaranthus* spp. can produce about **1,96,000 seeds per plant.**

3. Long Seed Viability

Weed seeds remain viable in soil for many years, forming a persistent seed bank.
Example: *Chenopodium album* remains viable for about **30 years**, while wild mustard remains viable for about **20 years**.

4. Seed Dormancy

Dormancy enables viable seeds to survive under unfavourable conditions and germinate when conditions become favourable. Weed seeds may exhibit:

- *Innate dormancy; e.g-*
- *Induced dormancy; e.g-*
- *Enforced dormancy; e.g-*

Example: *Avena fatua* (wild oat) exhibits all three types.

5. Efficient Seed Dispersal

Weed seeds are dispersed by wind, water, animals, birds, farm machinery and human activities, facilitating rapid spread.

Example: *Parthenium hysterophorus* was introduced into India through imported food grains.

6. Vegetative Propagation

Many perennial weeds reproduce through vegetative structures such as rhizomes, tubers, bulbs and roots, making their control difficult.

Examples:

- *Cyperus rotundus* – tubers
- *Cynodon dactylon* – rhizomes
- *Wild onion* – bulbs

7. Regeneration Ability

Even small fragments of roots, rhizomes or stems can produce new plants, allowing weeds to re-establish after mechanical control.

8. Strong Competitive Ability

Weeds compete aggressively with crops for nutrients, water, light, space and carbon dioxide, thereby reducing crop growth and yield.

9. Allelopathic Effect

Certain weeds release toxic chemicals that inhibit the germination and growth of neighbouring crop plants.

Example: *Parthenium hysterophorus*.

10. Adaptability and Weed Succession

Weeds adapt rapidly to changing environments and agricultural practices. Continuous use of the same herbicide may result in herbicide-resistant biotypes and changes in weed flora.

Weed Management in Organic Farming

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Weeds are major constraints to crop production as they compete with crops for **water, nutrients and sunlight**. They may also harbour pests and diseases. In organic farming, the aim is not complete eradication of weeds but to **manage them below economically harmful levels** using ecological and non-chemical methods.

Critical Period of Weed Control

The critical period is the stage of crop growth when weeds must be controlled to prevent significant yield loss. For example, it is about **4 weeks after planting in potato** and **3–6 weeks after emergence in carrot**.

Methods of Weed Management

1. Cultural Methods:

These prevent or suppress weeds through changes in the cropping system. Important practices include:

1. **Crop rotation** to disrupt weed growth cycles.
2. **Cover crops** such as rye, buckwheat and red clover to suppress weeds through dense ground cover.
3. **Intercropping and mulching** to occupy or cover the soil surface.
4. **Competitive varieties and narrow row spacing** to shade the soil quickly.
5. **Field scouting and sanitation** to detect and prevent weed spread.
6. Proper **nutrient and water management**, including buried drip irrigation.

2. Mechanical Methods:

Weeds are controlled by **hand weeding, hoeing, harrowing, inter-row cultivation and rotary hoeing**. Blind cultivation destroys very young weeds through shallow cultivation.

3. Thermal Methods:

Flaming uses heat to destroy young weeds, while **soil solarization** uses solar heat under clear plastic to reduce the weed-seed bank.

4. Biological Methods:

Natural organisms and interactions are used to suppress weeds. **Allelopathic crops** such as rye and buckwheat inhibit weed growth. Bio-agents include *Zygogramma bicolorata* against *Parthenium* and *Neochetina* spp. against water hyacinth. **Mycoherbicides** are also used against specific weeds.

Integrated Weed Management

No single method is sufficient. Therefore, organic farming combines **crop rotation, cover crops, mulching, competitive varieties, sanitation, proper nutrient and water management, mechanical, thermal and biological methods**.

Conclusion

Thus, effective organic weed management focuses on **prevention, reduction of the weed-seed bank and control during the critical period**, providing sustainable weed suppression without dependence on chemical herbicides.

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