



Weed science

Weed: Weed is a plant growing where it is not desired.

- ❖ Weeds cause drastically annual losses to Indian agriculture which is more than the combined losses caused by insect-pest and disease
- ❖ Among the pests, weeds accounts for 15% reduction In yield while the insects 30%, diseases 20%, and other pests 5%
- ❖ In India, Overall average losses to crops yield due to weed - 25 %
- ❖ Congress grass or carrot grass i.e. *Parthenium hysterophorus* and Sneezeweed *Helenium* spp. responsible for dermal allergies in human beings.

Allelopathy: Any direct/indirect harmful effect, one plant has on another through the production of chemical compounds that escape into environment known as allelopathy. These chemicals are secondary metabolites

- ❖ Weeds interfere with crops as competition + allelopathy.
- ❖ Johnson grass *S. heilebrandii* at its tillering stage is poisonous to animal due to their high prussic acid /HCN (Dhurrin) content

Dropsy: Mexican poppy *Le. Argemone mexicana* seeds mixed with mustard seeds and crushed brought death and blindness in human being Dropsy tragedy has occurred in Delhi in 1998.

Censer Mechanism: eg. *Argemone Mexicana* the wind swings the intact plant and forces their mature pods to disperse seeds some distance away from the mother plant.

- Weeds are competitive persistent, pernicious (Harmful), and interfere negatively with human activity

There are more than 250,000 species of plants worldwide of those, more than 5% behaves as weeds

About 10,000 are known to cause serious losses. In the list of world's worst weeds nut grass (*Cyperus rotundus*) ranks first and hariali (*Cynodon dactylon*) second position. Father of weed science - Jethro tull

Classification of Weeds:

1. **Based on life span:** Based on life span (Ontogeny), weeds are classified as Annual weeds

Biennial weeds and Perennial weeds



A. Annual Weeds: Weeds that live only for a season or a year and complete their life cycle in

that season or year are called as annual weeds

Most common field weeds are annuals. The examples are

1. **Monsoon annual:** *Commelina benghalensis*, *Boerhavia erecta*
2. **Winter annual:** *Chenopodium album*

B. Biennials - It completes the vegetative growth in the first season, flower and set seeds in the succeeding season and then dies. These are found mainly in non-cropped areas Eg *Alternanthera echinata*, *Daucus carota*

Perennials - Perennials live for more than two years and may live almost indefinitely. They adapted to withstand adverse conditions

And hence they are further classified into

1. **Simple perennials:** Plants propagated only by seeds Eg *Sonchus arvensis*
2. **Bulbous perennials:** Plants which possess a modified stem with scales and reproduce mainly from bulbs and seeds. Eg. *Allium* sp.
3. **Corm perennials:** Plants that possess a modified shoot and fleshy stem and reproduce through corm and seeds. Eg Timothy (*Phleum pratense*)
4. **Creeping perennials.** Reproduced through seeds as well as with one of the following
 - A. **Rhizome.** Plants having underground stem - *Sorghum halepense*
 - B. **Stolon:** Plants having horizontal creeping stem above the ground - *Cynodon dactylon*
 - C. **Roots :** Plants having enlarged root system with tumorous buds - *Convolvulus arvensis*
 - D. **Tubers:** Plants having modified rhizomes adapted for storage of food - *Cyperus rotundus*

2. Based on ecological affinities:-

A. Wetland weeds: They are tender annuals with semi aquatic habit. They can thrive as well

under water logged and in partially dry condition. Propagation is chiefly by seed. Eg *Ammania baccifera*, *Eclipta alba*.



B. Garden land weeds (Irrigated lands): These weeds neither require large quantities of water like wetland weeds nor can they successfully withstand extreme drought as dryland weeds Eg *Trianthema portulacastrum*, *Digera arvensis*

C. Dry lands weeds: These are usually hardy plants with deep root system. They are adapted to withstand drought on account of mucilaginous nature of the stem and hairiness Eg *Tribulus terrestris*, *Argemone Mexicana*.

3. Based on soil type (Edaphic)

A. Weeds of black cotton soil: These are often closely allied to those that grow in dry condition

Eg: *Aristolochia bracteata*.

B. Weeds of red soils: They are like the weeds of garden lands consisting of various classes of plants. Eg *Commelina benghalensis*

C. Weeds of light, sandy or loamy soils: Weeds that occur in soils having good drainage. Eg

Leucas aspera.

D. Weeds of laterite soils: Eg. *Lantana camara*, *Spergula arvensis*

4. Based on place of occurrence:

A. Weeds of crop lands: The majority of weeds infest the cultivated lands and use hindrance the farmers for successful crop production, Eg *Phalaris minor* in wheat

B. Weeds of pasture lands: Weeds found in pasture / grazing grounds. Eg *Indigofera enneaphylla*

C. Weeds of waste places: Corners of fields, margins of channels etc. where weeds grow in profusion. Eg. *Gynandropsis pentaphylla*, *Calotropis gigantea*

D. Weeds of playgrounds, road-sides: They are usually hardy, prostrate perennials, capable of withstanding any amount of trampling. Eg *Alternanthera echinata*, *Tribulus terrestris*

5. Based on Origin:



A. Indigenous weeds: All the native weeds of the country are coming under this group and most of the weeds are indigenous. Eg *Acalypha indica*, *Abutilon indicum*

B. Introduced or Exotic weeds: These are the weeds introduced from other countries. These weeds are normally troublesome and control becomes difficult, eg : *Parthenium hysterophorus*, *Phalaris minor*, *Acanthospermum hispidum*

6. Based on cotyledon number: Based on number of cotyledons it possess it can be classified as dicots and monocots.

A. Monocots : Eg *Panicum flavidum*, *Echinochloa colona*.

B. Dicots: Eg *Crotalaria verucosa*, *Indigofera viscosa*

7. Based on Soil pH : Based on pH of the soil the weeds can be classified into three categories :

A. Acidophile : Acid soil weeds eg *Rumex Acetosella*

B. Basophile: Saline & alkaline soil weeds eg. *Taraxacum sp.*

C. Neutrophils: Weeds of neutral soils eg *Acalypha indica*

8. Based on morphology : Based on the morphology of the plant, the weeds are also classified into three categories. This is the most widely used classification by the weed scientists.

A. Grasses: All the weeds come under the family Poaceae are called as grasses which are characteristically having long narrow spiny leaves. The examples are *Echinochloa colonum*, *Cynodon dactylon*

B. Sedges: The weeds belonging to the family Cyperaceae come under this group. The leaves are mostly from the base having modified stem with or without tubers. The examples are *Cyperus rotundus*, *Fimbristylis miliacea*.

C. Broad leaved weeds: This is the major group of weeds as all other family weeds come under this except that is discussed earlier. All dicotyledon weeds are broad leaved weeds. The examples are *Flavaria australica*, *Digera arvensis*, *Tridax procumbens*,

9. Based on nature of stem : Based on development of bark tissues on their stems and branches, weeds are classified as woody, semi-woody and herbaceous species



A. Woody weeds : Weeds include shrubs and undershrubs and are collectively called brush weeds Eg Lantana camera, Prosopis juliflora.

B. Semi-woody weeds: Croton sparsiflorus

C. Herbaceous weeds: Weeds have green, succulent stems are of most common occurrence around us Eg Amaranthus viridis

10. Based on specificity:

Besides the various classes of weeds, a few others deserve special attention due to their specificity

They are

A. Poisonous weeds

B Parasitic weeds

C. Aquatic weeds

A. Poisonous weeds : The poisonous weeds cause ailment on livestock resulting in death and cause great loss. Eg Datura fastuosa, D. stramonium and D. metal are poisonous to animals and human beings .

The berries of Withania somnifera and seeds of Abrus precatorius are poisonous.

B. Parasitic weeds: The parasite weeds are either total or partial which means, the weeds that depend completely on the host plant are termed as total parasites while the weeds that partially Depend on host plant for minerals and capable of preparing it's food from the green leaves are called as partial parasites. Those parasites which attack roots are termed as root parasites and those which attack shoot of other plants are called as stem parasites. The typical examples are -

1. **Total root parasite:** Orabanche cernua on Tobacco

2. **Partial root parasite:** Striga lutea on sugarcane and sorghum

3. **Total stem parasite:** Cuscuta chinensis on leucerne and onion

4. **Partial stem parasite:** Loranthus longiflorus on mango and other trees

C. Aquatic weeds: Unwanted plants, which grow in water and complete at least a part of their life cycle in water are called as aquatic weeds. They are further grouped into four categories as submersed, emersed, marginal and floating weeds.



1. **Submersed weeds:** These weeds are mostly vascular plants that produce all or most of their vegetative growth beneath the water surface, having true roots, stems and leaves. Eg. *Utricularia stellaris*, *Ceratophyllum demersum*.

2. **Emersed weeds:** These plants are rooted in the bottom mud, with aerial stems and leaves at or above the water surface. The leaves are broad in many plants and sometimes like grasses. These leaves do not rise and fall with water level as in the case of floating weeds. Eg. *Nelumbium speciosum*, *Jussieua repens*,

3. **Marginal weeds:** Most of these plants are emersed weeds that can grow in moist shoreline areas with a depth of 60 to 90 cm water. These weeds vary in size shape and habitat. The important genera that comes under this group are: *Typha*, *Polygonum*, *Cephalanthus*, *Scirpus*, etc

4. **Floating weeds:** These weeds have leaves that float on the water surface either singly or in cluster. Some weeds are free floating and some rooted at the mud bottom and the leaves rise and fall as the water level increases or decreases. Eg. *Eichhornia crassipes*, *Pistia stratiotes*, *Salvinia*, *Nymphaea pubescens*

Weed Dormancy	It is a stage of suspended development
Enforced Dormancy	Due to deeper placement of seeds
Innate Dormancy	Genetically controlled dormancy
Induced Dormancy	Due to sudden physico changes like water logging