

1) Weed:

Weed is a plant growing where it is not desired. In the other words, any plant not shown in the field by the farmer is out of place and called weed. Britain farmer Jethro Tull was the first person who defined weeds in 1711 in his book 'Horse Hoeing Husbandry'.

If farmer has sown a sorghum crop in the field then called the plant / vegetation. And other than sorghum in that field are considered as weeds (undesired / unwanted seeds). So, a plant could be undesirable at one place and desirable at other place.

For example Henrioli, foxtail and goose grass are valuable plant in pasture but in crop-field these are well-known weeds.

In the view to fact and figures, out of 2,50,000 plant species, weeds constitutes about 250 species.

Features of weeds:

- (i) perennial weeds modify underground and surface stem, and stop the growth.
- (ii) They quickly produce dense foliage and shade out competing crop seedling.
- (iii) many weeds use C_4 photosynthesis allowing them to fix carbon more efficiently.
- (iv) They have both sexual and asexual reproduction.

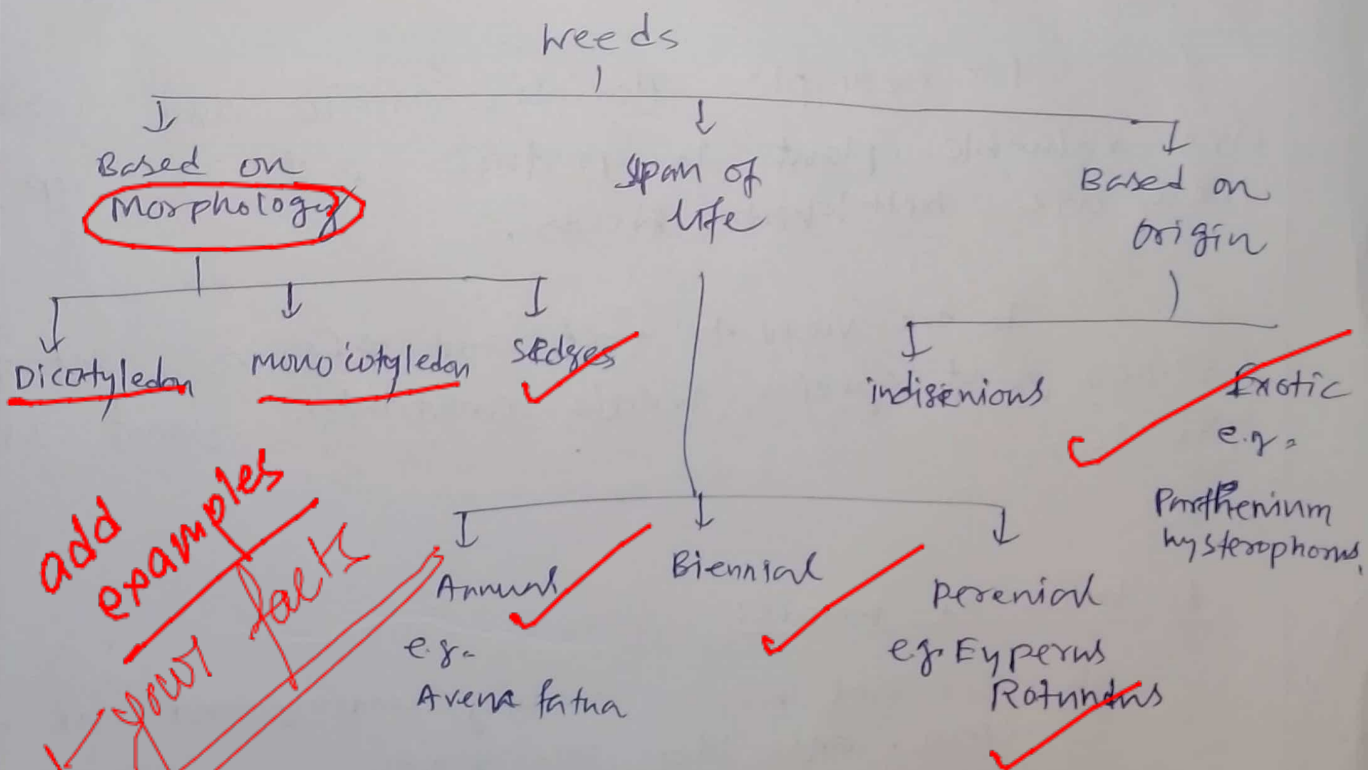
impact:

Weeds act as both positive and negative effect on the crop production and environment.

(i) Reduce crop yield and quality and act as the reservoir for pest and diseases. ~~on the~~ other hand,

(ii) Weeds work on soil conservation and fix the nitrogen to fertilise the soil. Besides support biodiversity and animal fodders.

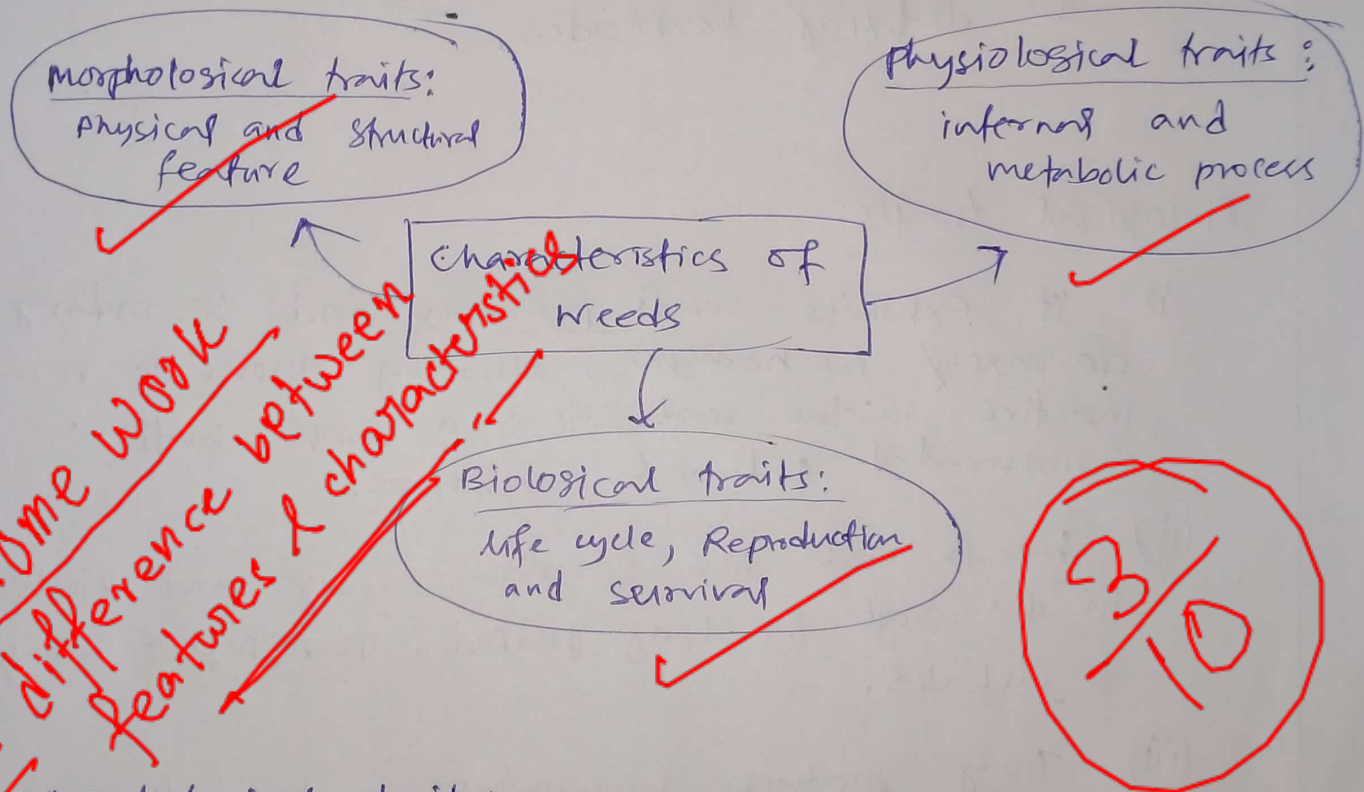
Classification:



In modern agronomy, weeds are no strangers to us. It directly threatens global food security and farming sustainability. Integrated weed management (IWM) is now combating with weeds management.

Characteristics of Weeds

Weeds possess specific morphological, physiological and biological traits that enable them to adapt, survive and thrive in competitive agricultural environments. Understanding these characteristics properly, below flow chart is very crucial -



Morphological traits:

- (i) Weeds are diverse dispersal structure like hooks, spines. They float in wind and water.
- (ii) Some are deep-rooted which are in tap-root and allow to soil moisture.
- (iii) Many perennial weeds modify underground and surface stem and stop the growth.
- (iv) They quickly produce dense foliage and shade out competing crop seedling.

Physiological traits:

- (i) Many weeds use C₄ photosynthesis process (high level photosynthesis) allowing them to fix carbon more efficiently.
- (ii) They synthesize and secrete chemical compounds e.g. - allelo-chemicals through roots which suppress plant growth and seed germination.
- (iii) They quickly develop bio-chemical mechanism to detoxify herbicides.

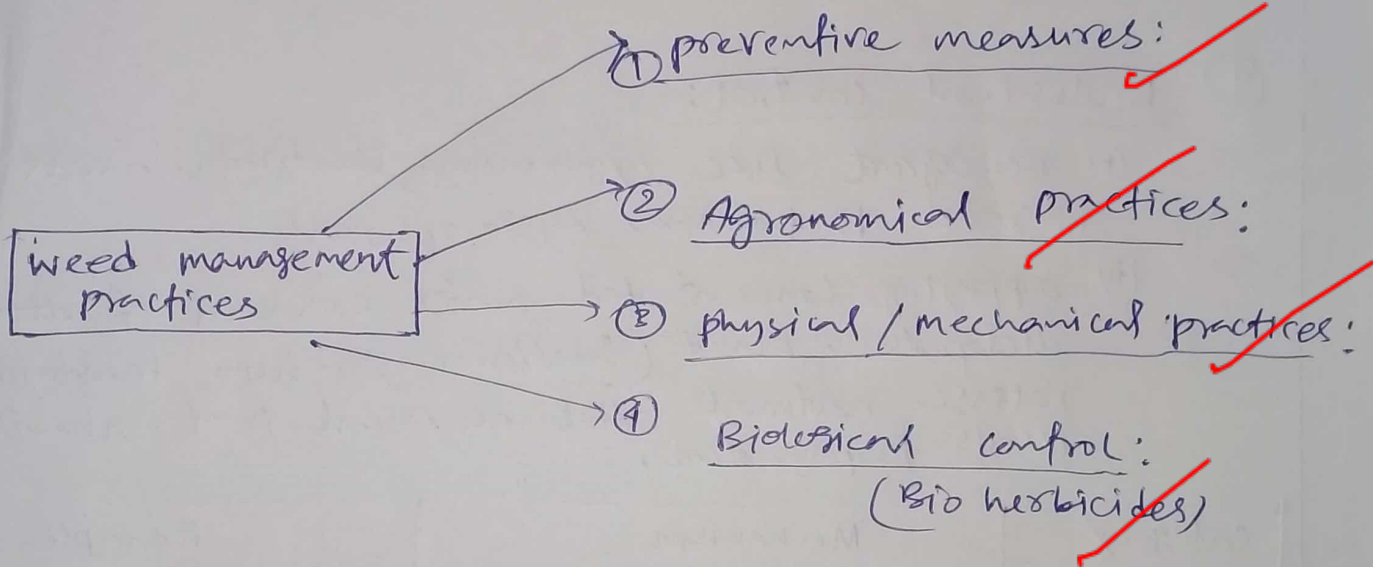
Biological traits:

- (i) It exhibits seeds primary and secondary dormancy mechanism, allowing them to remain inactive in the seed soil seed bank until environmental optimal condition.
- (ii) Weeds seeds can remain living and viable in the soil for long period, ranging from years to decades.
- (iii) They produce flowering and mature seeds.
- (iv) They have both sexual and asexual reproduction capacity to propagate.

In conclusion, The characteristic reproductive capacity to C₄ photosynthesis and seed dormancy mechanism make them highly successful invaders in agricultural ecosystem. These allow weeds to adapt rapidly in this climate change period.

③ Weed Management practices

In organic farming, synthetic herbicides are strictly prohibited. Integrated weed management (IWM) relies on ~~the~~ preventive, agronomical and physical, mechanical approaches, designed to suppress weed populations and reduce economic damage and enhance sustainable ~~crop~~ production well.



① preventive measure:

- (i) Use of clean-seed material like certified and weed-free crop into the arable land.
- (ii) Application of composted manure like hof farmyard manure (FYM) destroy weed by its thermal heat $(>55-60^{\circ}\text{C})$

② Agronomical practice:

- (i) crop rotation altering crop and grow inhibits the disruption of weed life cycle
- (ii) cover crop and green manure blocks weeds
- (iii) stale seedbed techniques left the land for 7-14 days to induce weed germination before crop production

③ Physical and mechanical practice:

- (i) organic mulching process manages to weed propagation. straw, dust, dry leaves blocks light transmission into the soil and suppress the weed germination. and conserve the soil moisture.
- (ii) covering moist soil with thin polythene sheet during peak summer and pasteurize weed seeds ($55-60^{\circ}\text{C}$) and soil borne pathogens.

④ Biological control:

(i) Bio-agent like Zygotriema bicolorata feeds on targeted Parthenium hysterophorus

(ii) applying concentrated water extracted of aromatic allelopathic plant (Sunflower, Sorghum, Mustard) release natural allelo-chemical that inhibits weeds propagation.

Category	Mechanism	Example
Preventive	Blocks <u>weed entry</u> and <u>disrupts</u> the <u>propagation</u>	Clean seeds, <u>decomposed FYM</u>
Agronomical	maximise <u>crop rotation</u> , <u>competition</u> with <u>disrupting weed life cycle</u>	Crop rotation Stale seedbed <u>technique</u>
Mechanical	<u>inhibits light</u> and <u>restore water</u>	<u>mulching</u> process <u>covering polythene</u>
Biological	use <u>Pisayant</u> and <u>Bio chemical</u> to <u>target weeds</u>	<u>Release natural allelochemical</u> , <u>stop weeds</u>

In summary, An Integrated weed management (IWM) in organic farming with these approaches keeps the soil situation, enhance flourishing economic value, sustainable agricultural production even it can maintain soil health well.