Definition of Weeds

- **The definition of weed is predicated on human perception , desire and needs.**

- *A weed is a plant which interferes with human activity or welfare.*

- *It is also defined as plant growing in a place where it is not desired at a particular point in time.*

Origin and Evolution of weeds

- *In a stable (climax) vegetation, all plant species are equally naturally adapted.*

Weeds evolved (i) when the stable environment is disturbed through human activities.

*(ii) from e*cotypes that have evolved from wild colonizers in response to continuous habitat disturbances and selection pressures.

(iii) as a result of the products of hybridization between wild domestic races of crop plants.

Effects of Cropping Practices on biodiversity

Practices that Increase Biodiversity:

- Intercropping

- Crop Rotation

- Cover cropping

- Strip cropping

Practices that Decrease Biodiversity:

- Monocropping

- Tillage

- Herbicides use

Biodiversity leads to more stability for the ecosystem as a whole.

Characteristics of Weeds

- Harmful to humans, animal and crops

- Wild and Rank growth in an environment

- Exhibits persistency and resistant to eradication

- High reproductive capacity: large number of seeds, possess different types of propagules

e.g. Seeds, tubers , rhizomes,stolons

- Seed Dormancy: could be innate, induced or enforced.

- Usually present in large populations..

- Could be regarded as being useless, unwanted and undesirable

- They exhibit spontaneous growth without being sown

- Some exhibit mimicry. (seed, vegetative and biochemical)

- Many weeds are aggressive and have rapid seedling growth

Economic Importance of Weeds

Detrimental effects:

- *Reduction in crop yield through:*

Physical Interaction (Allelospoly: competition for growth resources including water, light, nutrient, air, space.

Chemical interaction (Allelopathy)

- *Reduction in crop quality through*

- direct contamination of cultivated crops e.g rice and maize grain are contaminated by wild rice (*Oryza longistaminata*) and itchgrass (*Rottboellia cochinchinensis*) respectively.;

 - contamination of forage, silage or pasture crop .by *Cyperus. rotundus* seeds ,

 - reduction in Sugarcane juice quality by the presence of *Imperata cylindrica*.

 - Contamination of cotton lint by dried weed fragments

 - Damage of underground tuber of yam and cassava through piercing of Spear grass rhizomes

- Interference with field operations (harvest,pesticide application,etc.)

- *Some are poisonous to grazing animals* e.g.*Amaranthus spinosus* contains high level of nitrate and *Halogeton glomeratus* contain high oxalate content, it can kill livestock when eaten in dry season.

- Some are harmful to grazing animals e.g. *Amaranthus spinosus, Acanthospermum hispidus*

- increase cost of production; high cost of labour and equipment during harvesting.

- Presence of weeds can impede water flow in irrigation canals

- Weeds present in lakes and reservoirs can increase loss of water by evapotranspiration

- Reduction in quality of pasture land; it reduces the carrying capacity of grazing lands and pastures through their physical presence and weediness

- Reduction in quality of animal products; it affects the palatability of pastures, hay, silage etc. protein content in alfalfa wild garlic (Alliums spp) when eaten by cattle spoils the meat and the milk.

- Serve as alternate hosts for many plant diseases and animal pests e.g. insects, rodents, birds. *Cyperus rotundus* serve as alternate to nematodes and athropods

- Impose limitation to the farm size of a farmer

- Can serve as sources of fire hazards

Beneficial Effects :

- Reduce erosion problem through the production of protective cover

- Help in nutrient recycling through decay of vegetative part.

- Food/vegetables for humans e.g. leaves of *Talinum triangulare,* and tubers of *Colocasia esculentus* .

- Serve as hosts and nectar for beneficial insects

- Beautification of the landscape e.g. *Cynodon dactylon*

- Feed for livestock and wildlife and aquatic organisms in form of hay, silage and forage / pasture, fruit seeds and branches and whole plant.

- source of pesticides e.g. *Chrysanthemum cinerariifolium*

- Source of genetic material for useful traits in crop improvement.

- Medicinal use e.g neem (*Azadirachta indica), Ageratum conyzoides*

- Some serve as trap crop for parasitic weeds.

- Habitat for wildlife and plant species hence biodiversity conservation.

- Major role in carbon recycling through carbon sequestration. Field of exposed soil always suffers a net loss in organic matter and releases carbon dioxide, while a field covered with crops and/or weeds takes up carbon dioxide. This concept of carbon sequestration is an added advantage of sustainable and organic farming.

Classification of Weeds

Weeds can be classified based on

(1)   **Life cycle or history (Ontogeny) : Annual, Ephemeral, Perennial and   Biennials weeds**

(2)   **Habitat**: (a)   *Upland (terrestial)* weeds or dry land weeds (**Agrestal /**Weeds of arable or cultivated crops, and **Ruderal weeds** /weeds of disturbed non- cropped area such as rubbish heaps, landfills, paths, roads, compost heaps

(b)   *Aquatic weeds* (**Submerged aquatic, Floating aquatic, Emergent aquatic weeds**

(3)   **Growth habit**: Free living (autotrophic) weeds

ii   Parasitic plants(*Root parasitic weed*s or *obligate parasite, Stem parasitic weeds* , *Hemi parasitic weeds, Total parasites*

(4)   **Degree of undesirability**: ease and difficuly in controlling weeds.

(5)   **Morphology** : a.Form e.g. Woody Stem e.g *Azadirachta indica,*

 ii.   Semi Woody weeds- e.g *Chromolaena odorata, Sida acuta.*

Iii   Herbaceous weeds*: e.g Ageratum conyzoides, Talinum triangulare,*

b. Leaf Type : narrow leaf: grass like(ii) Broad leaf weeds (Dicotyledons):, Sedges; e.g. *Cyperus rotundus, C. esculentus, Mariscus alternifolius*

(6) **Scientific classification (Binomial nomenclature):** based on their taxonomy (family,, genera and specific epithet)

(7) **Ecological affinities** : dryland weeds, gardenland weeds and wetland weeds

(8) **Origin:** native or introduced.

Weed Ecology

• **Ecology** is the study of the relationship of plants and animals to their physical and biological environment. Physical environment like light, heat solar radiation, moisture, wind, oxygen, carbon dioxide, nutrient soil, water and atmosphere. Biological environment includes organism of the same kind as well as other plants and animals

• **Weed ecology** is generally about the growth characteristics (ii) adaptation (iii) survival mechanism of weed that enables them to exploit environmental resources and successfully colonize new habitat often at the expense of other neighboring plants

• **A habitat** is a dwelling place or a kind of environment occupied by the individuals of a species. Habitat may imply places like rubbish dump, farm land or other sites occupied by weeds.

• **Niche**: it is the condition in a location under which a species can live successfully. Within the habitat, organisms occupy different niches. A niche is the functional role of a species in a community—that is, its occupation, or how it earns its living. For example, the scarlet tanager lives in a deciduous forest habitat. Its niche, in part, is gleaning insects from the canopy foliage. The more a community is stratified, the more finely the habitat is divided into additional niches

WEED-CROP ECOSYSTEM

Ecosystem is the energy driven complex system in which the living organisms interact with themselves and the environment.

Weed- crop ecosystem involves weed-crop interaction as well as the nature and the function of that ecosystem. This will assist in understanding the impact of crop production and husbandry on the shifts in weed flora, for instance the persistent of weed in given weed- crop ecosystem.

Persistence and survival mechanism of weeds

Weed persistence is a measure of the adaptive potential of weeds that enables them to survive in disturbed environment such as i. Crop land ii. Recreational site iii. Irrigation canal and iv. Pastures

• **Survival mechanisms or adaptive features of annual weeds** include: i. Production of large quantities of seeds ii. Seed dormancy and iii. Periodicity of seed germination and short life span.

• **Survival mechanisms of perennial weeds** include: i. Deep rooting ii. Dormancy iii. characteristics of buds on rhizome iv. Other modified stems and v. Fragmentation of parts

Types of perennating and vegetative structures in perennial weeds:

1. Rhizome – underground, horizontal stem (quackgrass, swamp smartweed)

2. Stolon – aboveground, horizontal stem (bermudagrass)

3. Tuber – swollen stem tissue (yellow nutsedge)

4. Bulb – stem with shortened internodes and fleshy modified leaves (wild garlic)

5. offset

6. bulbils

7. corm

8. runners

9. suckers

Storage organs may act as 'perennating organs' These are used by plants to survive adverse periods in the plant's life-cycle (e.g.conditons caused by cold, excessive heat, lack of light or drought). During these periods, parts of the plant die and then when conditions become favourable again, re-growth occurs from buds in the perennating organs. For example geophytes growing in woodland under deciduous trees back to underground storage organs during summer when tree leaf cover restricts light and water is less available.

Crop mimicry

Crop mimicry is an example of the extent to which weeds have adapted themselves to survive in that frequently disturbed site.

Crop mimicry is defined as the phenomenon whereby weeds develop morphological and biochemical close resemblance to some phases in the life history of a crop as to be mistaken for the crop and thus evade eradication

Types of crop mimicry

*Vegetative mimicry:*A situation where close similarity in appearance occurs between weeds and crops at seedling and vegetative stages .e.g. wild rice (O*ryza longistaminata)* in cultivated rice ; wild sorghum (*Sorghum halepense)* in cultivated sorghum, wild sugarcane (*Saccharum spontaneum)* in sugarcane.

*Seed mimicry:*This is a situation whereby the similarities between weeds and crops is observed in seed, weight, size and appearance. e.g. similarity in seed size between seeds of upland rice and those of itch grass (*Rottboellia cochinchinensis)*.

*Biochemical mimicry:*This is a situation in which a weed develops resistance to a herbicide that has been used previously for selective control in a given crop.

Factors affecting weed persistence

•   Weed persistence can be affected by:

•   Climate e.g light, temperature, water, and wind

•   Soil (edaphic)

•   Biotic factors e.g. plants and animals