F3 Syllabus Meter

1. Selection and Breeding
2. Livestock Rearing Practices
3. Farm structure —
4. Land Tenure and Land Reform
5. Soil and Water Conservation
6. Weeds and Weed Control
7. Crop Pests and Diseases
8. Field Practices II
9. Forage crops
10. Livestock Health III

CHAPTER SIX
WEEDS AND WEED CONTROL

6.1.0 Specific Objectives

- By the end of the topic, the learner should be able to,
- define a weed
- identify weeds
- classify weeds
- explain the characteristics which make the weeds competitive
- describe ways of controlling weeds
- state harmful effects of weeds
- control weeds
- exercise safety measures to oneself, to crops and the environment while controlling weeds.

6.2.0 Content

- 6.3.0 Weeds: definition of a weed, weed identification and classification, competitive ability of weeds (appropriate examples for each ability), harmful effects of weeds (appropriate examples for each effect)
- 6.4.0 Weed control methods: chemical weed control (classes of herbicides, methods of application and safety measures in use of chemicals), mechanical weed control, cultural weed control, biological weed control, legislative control.

What is a weed?

- A weed is any plant growing where it is not required and whose economic disadvantages outweigh the advantages.
- Crops that volunteer to grow without having been planted are weeds and are called self-setters.
- Some weeds are dangerous and their cultivation is prohibited by law, such weeds are called noxious weeds.

WEED IDENTIFICATION AND CLASSIFICATION

- Weeds are identified by individual plant names.
- They are named according to specific features or a person who found them.
- According to the international committee on Botanical nomenclature no two plants share the same name.
- Weeds are commonly identified using both common English names and vernacular names
- The botanical names are preferred because they are recognized internationally.
- These names have two parts, the first part refers to the genus while the second part represents the species..
- They are usually written in italics or underlined.

Botanical name	*Common name*
1. *Amaranthus spp.*	Pigweed*
2. *Achyranthes aspera*	Devil's Horse Whip
3. *Cynoglossum Caerulum*	Forget-me-not*
4. *Bidens pilosa*	Black jack*
5. *Galinsoga parviflora*	Macdonald's eye (Gallant sodier)*

6. *Tagetes minuta* Mexican marigold*
7. *Tarchonathus camphoratus* Leleshwa
8. *Brassica napus* Wild rape*
9. *Cyperus rotundus* Nut grass/sedge*
10. *Digitaria scalarum* Couch grass*
11. *Cynodon dactyl on* Star grass
12. *Chioris pyrothrip* False star grass
13. *Pennisetum clandestinum* Kikuyu grass

14. Eleusine indica Wild finger millet
15. Avena fatua Wild oat*
16. Setaria verticillata Fox tail love grass
17. Leonitis nepet Lion’s ear
18. Malva verticillata Mallow*
19. Oxalis lat Oxalis (Sorrel)*
20. *Striga hermontheca* Striga (Witch weed)*
21. Datura stramonium Thorn apple*

22. *Nicandra physalodes* Chinese lantern*
23. *Solanum incanum* Sodom apple*
24. *Lantana camara* Lantana (Tick berry)*
25. *Solanum nigrum* Black night shade
26. *Commnelina Benghalensis* Wandering Jew*
27. *Urtica massaica* Stinging nettle*
28. *Oxygonum sinuatum* Double thorn*
29. *Sonchus oleraceus* Sow thistle*
30. *Conyza Banariensis* Fleabane

31) *Centranrea melitensis* Maltese thistle

32) *Pteridium aquilinum* Bracken fern*

33) *Gallium spurum* Goose grass (cleavers)*

34) *Chenopodium opulifolium* Fat hen (goose foot)

35) *Altenathera pungens* Khaki weed

36) *Abutilon ,naurianum* Abutilon*

Black night shade.



Pig weed



kikuyu grass.



Green fox tail overall.




DOUBLE THORN

Devils horse whip



Field bind weed.





Datura.




sow

BRACKEN FERN



MALLOW



Sodom apple.



OXALIS



STRIGA(WITCH WEED)



Lantana.



NUT GRASS(SEDGE)



FORGET ME NOT



Wild rape.

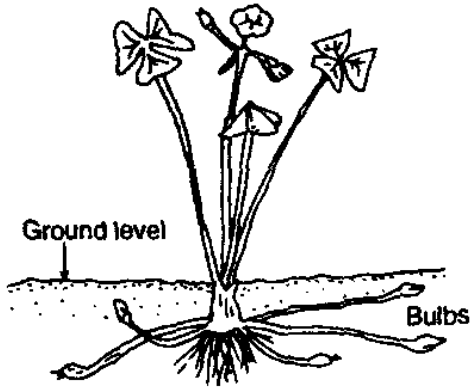


Wild oat.



Wandering Jew.

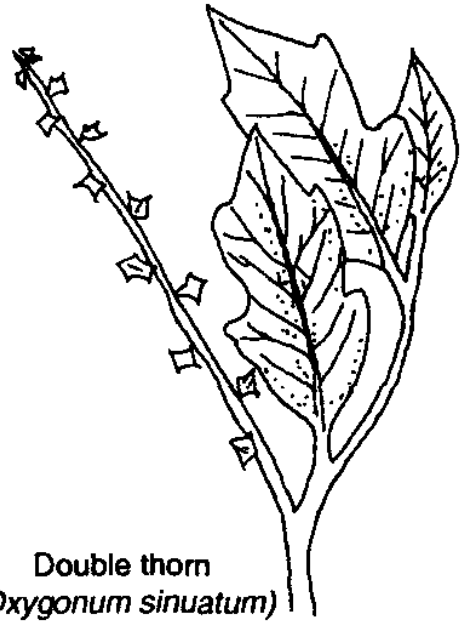




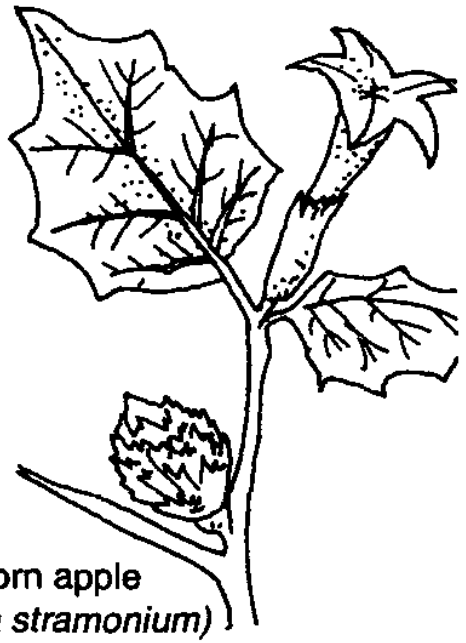
Oxalis (sorrel)
(Oxalis latifolia)



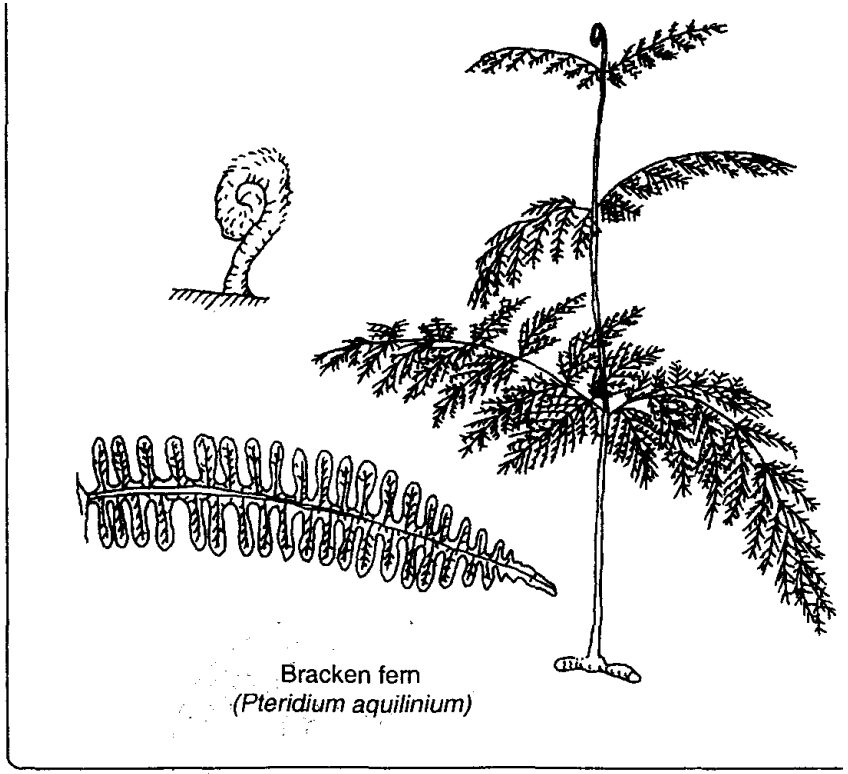
Forget-me-not
(Cynoglossum caeruleum)



Double thorn
(Oxygonum sinuatum)



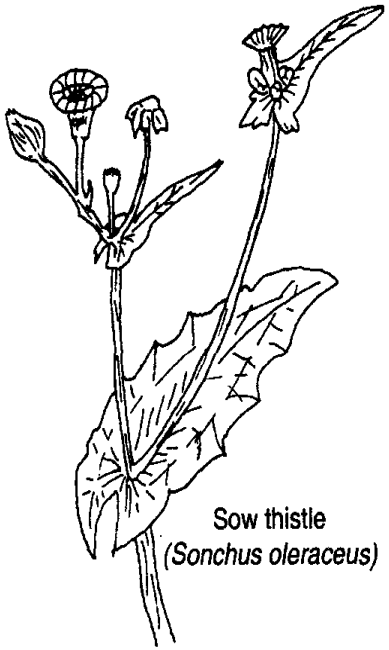
Thorn apple
(Datura stramonium)



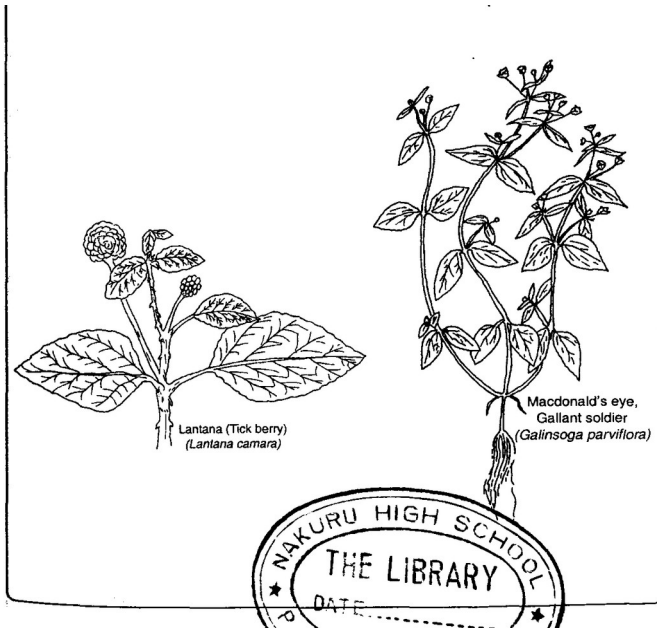
Bracken fern
(Pteridium aquilinium)



Pigweed
(Amaranthus hybridus)



Sow thistle
(Sonchus oleraceus)

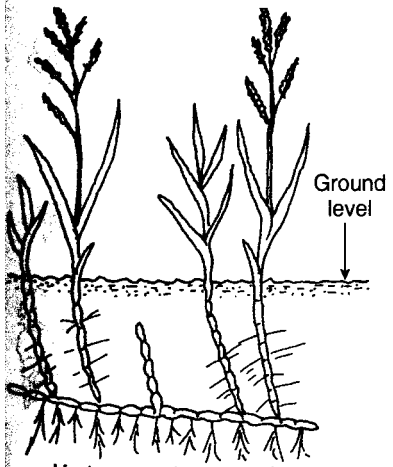


NAKURU HIGH SCHOOL
THE LIBRARY
DATE

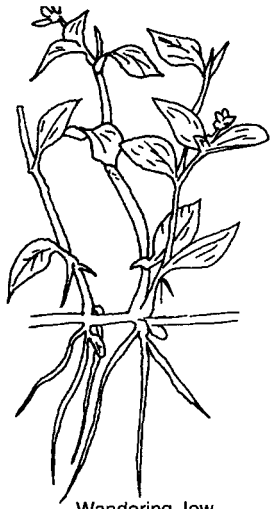








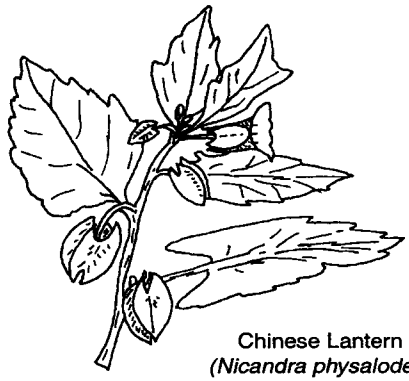
Underground roots and stems
Couch grass
(Digetaria scalarum)



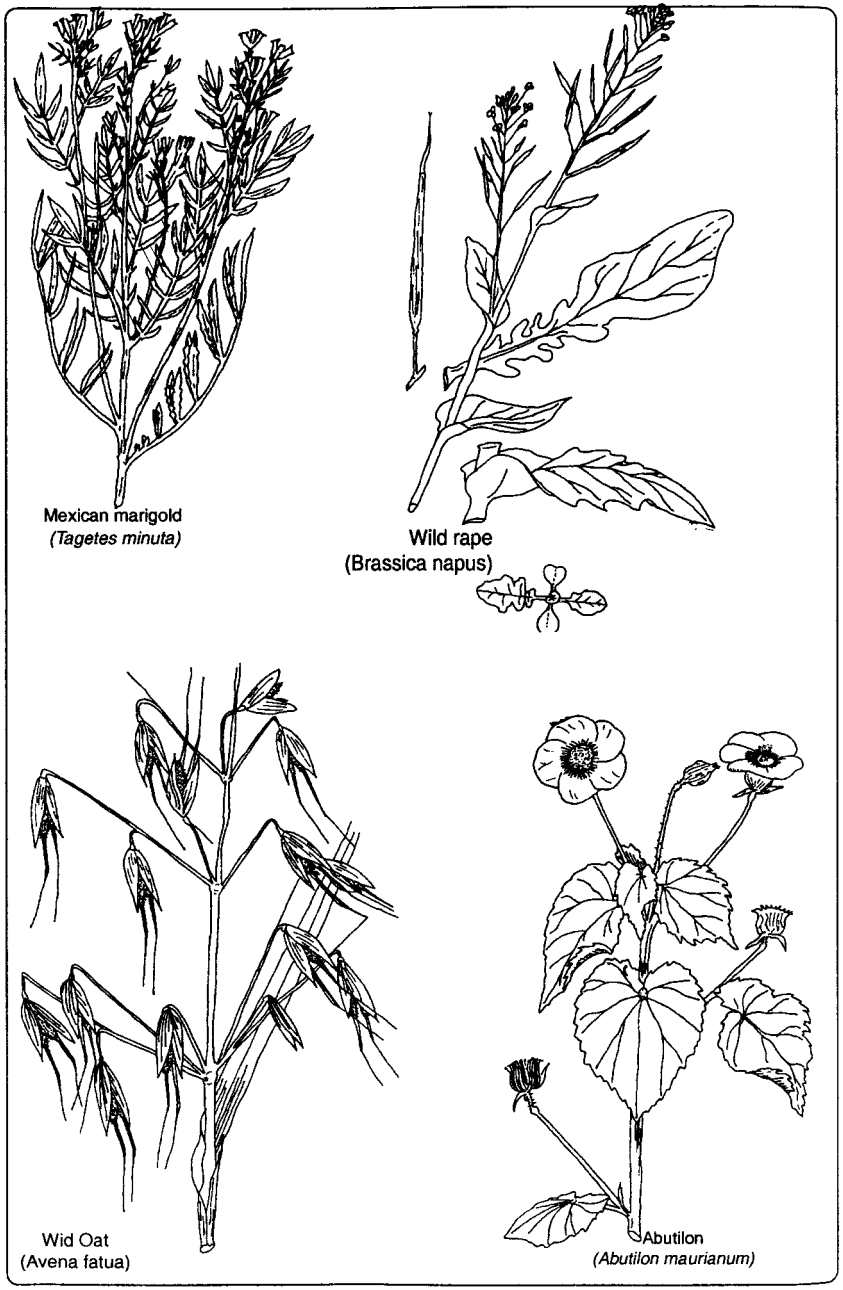
Wandering Jew
(Commelina benghalensis)

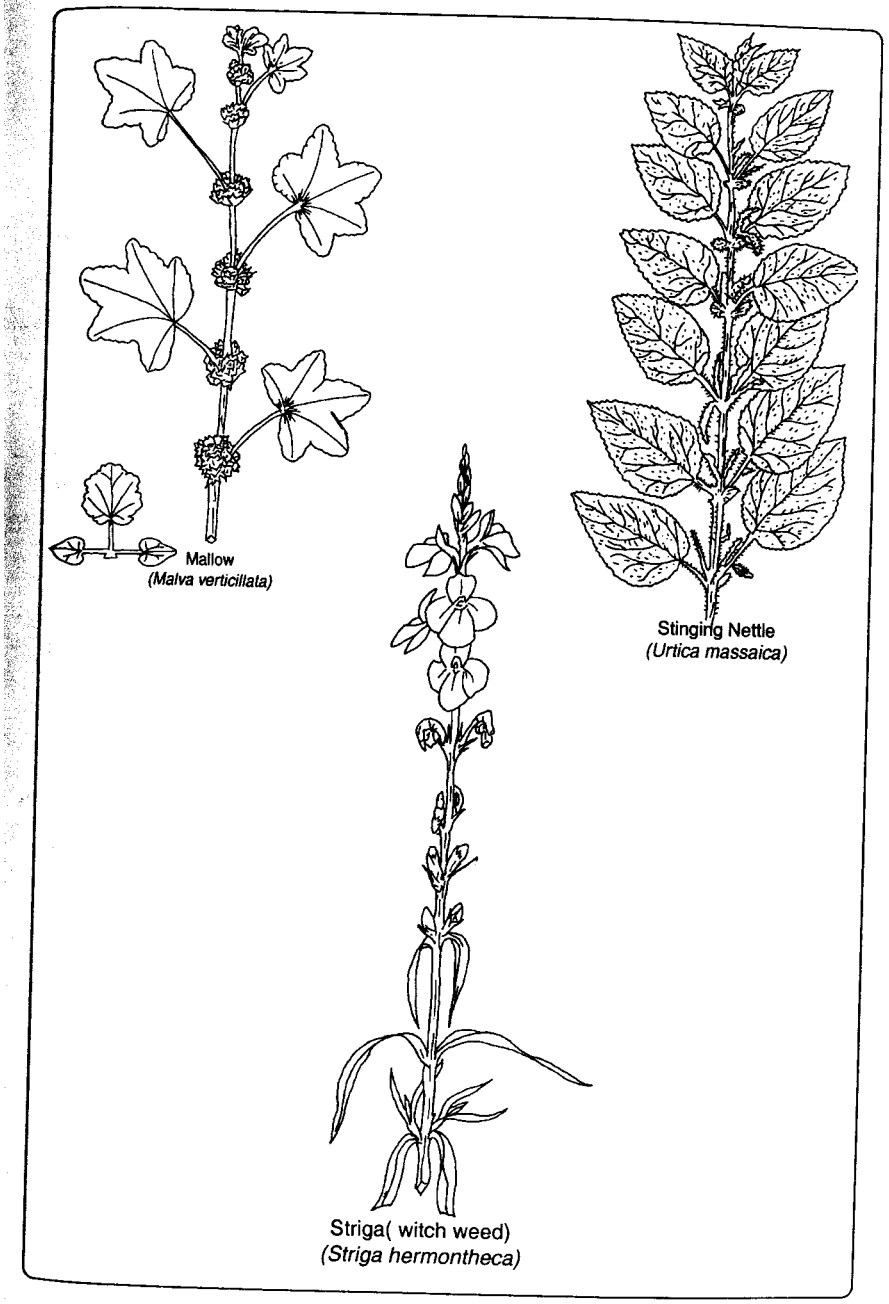


Nut grass(sedge)
(Cyperus rotundus)



Chinese Lantern
(Nicandra physalodes)


Mexican marigold
(Tagetes minuta)
Wild rape
(Brassica napus)
Wid Oat
(Avena fatua)
Abutilon
(Abutilon maurianum)


Mallow
(Malva verticillata)
Stinging Nettle
(Urtica massaica)
Striga(witch weed)
(Striga hermontheca)

Classification of Weeds

can be classified either on the basis of ;

- growth cycles -annual, biennual and perennial
- plant morphology – broad leaved and narrow leaves

Growth Cycle (a) Annual Weeds

- complete their life cycle in one year or less.
- They include Mexican marigold, Black jack, Pigweed and others.

Biennial Weeds

- complete their life cycle in two years.
- These include American wild carrot, Spear thistle, etc

Perennial Weeds

- - take more than two years or seasons to complete their life cycles.
- include Sedges, Lantana, Kikuyu grass, Wandering Jew, Couch grass, Sodom apple and others.
- most difficult to control.

Plant Morphology

- (a) Narrow-leaved Weeds
  - These are mostly grass weeds.
  - They include Couch grass, Spear grass, Setaria, Eleusine and others. Grass weeds may be perennial or annual.
- (b) Broad-leaved Weeds
  - These include weeds like Black jack, Oxalis, Lantana, Pigweeds, Devil’s horse whip and others.
  - These weeds may be annual or perennial.

Reasons for Competitive Ability of Weeds

- (i) Ability to produce large quantities of seeds
- (ii) Weed seeds remain viable .
- (iii) Most weed seeds are easily and successfully dispersed.
- (iv) Some seeds have ability to propagate vegetative.
- Elaborate or extensive root system
- Ability to survive even.
- Short life cycle

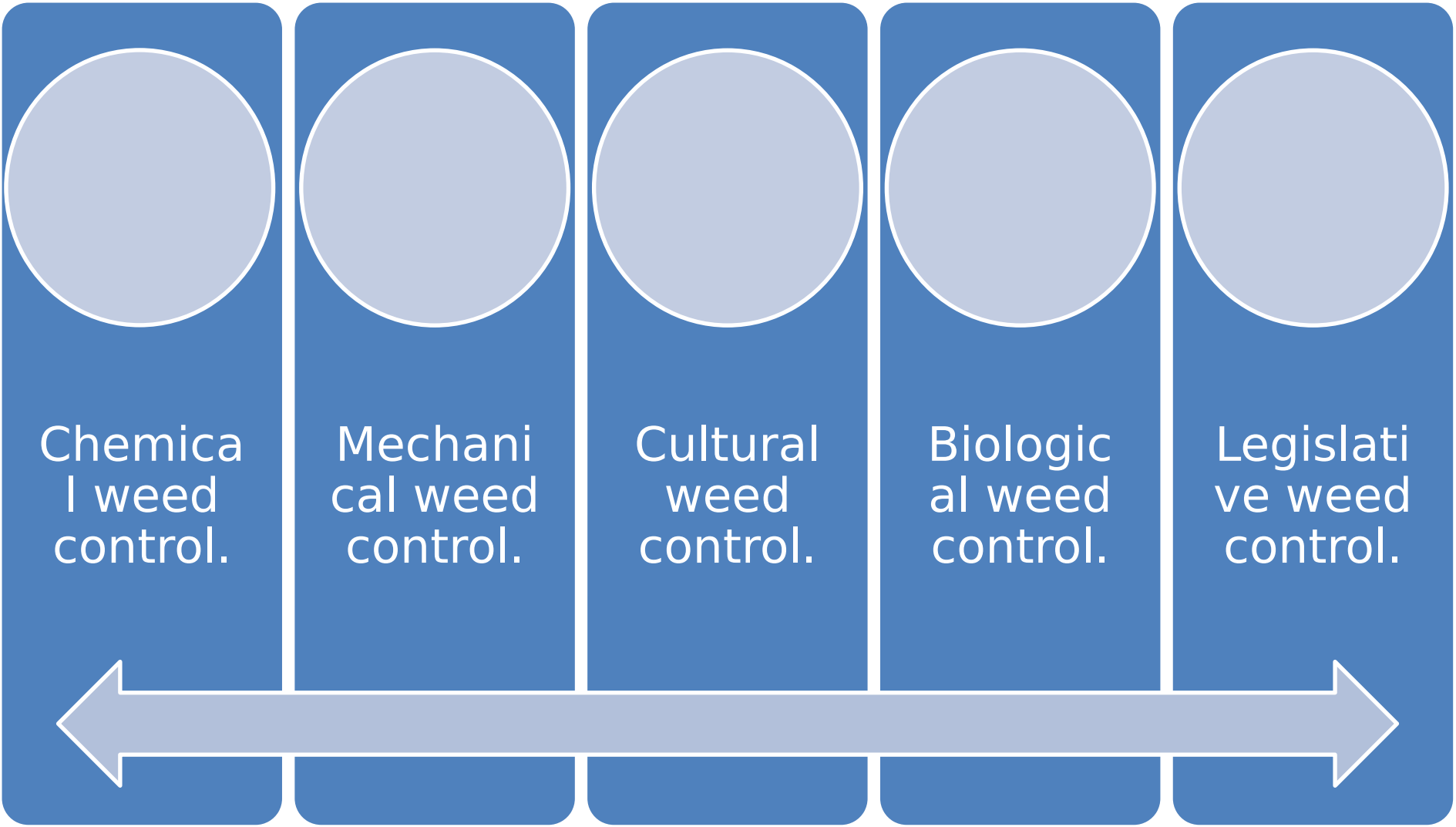
Harmful Effects of Weeds

- (a) Weeds compete with crops
- (b) Some weeds, are parasitic
- (c) Some weeds lower the quality of agricultural produce.
- (d) Some weeds are poisonous to man and livestock
- (e) Some weeds act as alternate hosts for insect pests and others for diseases,
- (f) Some weeds are allelopathic.
- (g) Some weeds block irrigation channel
- (h) Aquatic weeds affect fishing .
- (i) Weeds lower the quality of pastures.
- (j) Some weeds are difficult to handle and control because they irritate the workers

Weeds benefits to the farmer

- (a) Some weeds are edible to both man and livestock
- (b) Some weeds have medicinal effects.
- (c) Weeds act as soil cover.
- (d) Weeds add organic matter to the soil.
- (e) Leguminous weeds fix nitrogen in the soil.

The method of weed control



Chemical Weed Control
Herbicides work in a variety of ways to kill weeds

- (a) Inhibition of Nitrogen Metabolism- interfere with the formation of nucleic acid
- (b) Killing the Cell: - The cell wall is destroyed and chemical enters the cell cytoplasm killing it.
- (c) Causing Abnormal Tissue Development:
- (d)Some herbicides cause abnormal growth of tissues, such as twisting and gall formation.
- Inhibiting Photosynthesis: interfere with chlorophyll formation
- (e) Inhibiting Respiration: - block movements of materials from the site of manufacture to other areas.

Classification of Herbicides

- **(a) Formulation:** -
- This is the physical form of the herbicide. Herbicides are available in the following forms:
  - (i) Liquids - are soluble either in water or in oil.
  - (ii) Wettable Powders - finely ground particles mixed with water to form a suspension before application.
  -

(b) Time of Application:-

- at different stages of weed growth.
  - (i) Pre –emergence- applied soon after crop seeds have been sown
  - Post-emergence- applied after crop germination or transplanting. Eg Paraquat, Glyphosate
  -

- **C)Selectivity**
- classified as selective and non-selective.

Factors Affecting Selectivity and Effectiveness of Herbicides

- (i) Stage of plant growth:
  - • Leaf angle-
  - • Nature of Leaf Surface-
  - • Differential Height of Plants
  - • Location of Growing Points
  - • Difference in Root Systems –

- **Specialized Structures**Some plants have specialized underground structures are not easily killed by herbicides.
- Physiological/Metabolic Factors: rate of absorption and translocation
- Herbicides Characteristics: - Herbicides which interfere with photosynthesis are non- selective.
- Concentration
- The concentration of the herbicide will also affect selectivity that is- under high concentration the herbicide is likely to kill all kinds of plants.

• Formulation

- This is the form in which the herbicide is applied.
- Formulation of herbicides affect selectivity for example oil formulations are more toxic to plants.

- Explain how **five** factors affect efficiency and effectiveness of herbicides (10mks)

• Method of Application

- A part from the nature of the herbicide, application methods may also affect selectivity.
- High selectivity is attained by placing the herbicide where the weed is and away from the crop.

(d) Mode of Action

- Herbicides are classified as contact and translocated.
- Contact herbicides are those which kill only the parts of the plant with which it comes into contact.
- The translocated or systemic herbicides kill the whole plant even if it has come into contact with only a small part of it.
- This type of herbicide is absorbed into the plant and is translocated to all parts of the plant.

(e) Environmental Factors

- Some environmental factors affect the effectiveness of a herbicide.
- (i) Wind —
- (ii) Rain
- (iii) Soil —
- (iv) Light —.
- (v) Temperature —

Safety Precautions in Use of Chemicals

- (a) Read manufacturer’s instructions and follow them.
- (b) The user should wear protective clothing.
- (c) Avoid inhaling the herbicide.
- (d) The user must bath thoroughly
- (e) The user must not blow or suck blocked nozzles.
- (a) The user should avoid herbicide drift to unintended crops.
- (b) Drift to animal feeds and water should be avoided.
- (c) The user should avoid spilling herbicides
- (d) empty containers must be properly disposed of,
- (e) Spraying equipment must not be washed in water sources
- (f) All chemicals must be stored in safe
- (g) Equipment must be thoroughly washed.

- **Safety precautions when using herbicides kcse 2009**
- One should wear protective clothing such as masks, glove, overalls and boots.
- Avoid inhaling the herbicides by not smoking while spraying/spray alone the education of wind
- Read the manufacturer's instructions and follow them strictly
- Avoid sucking or blowing blocked nozzles
- Immediately after handling chemicals the user must wash thoroughly to remove chemical traces.
- Herbicides should be stored in a safe place away from food and out of reach of children
- Equipment used in herbicide application should not be washed in water sources used by humans and animals/to prevent pollution.
- Equipment used in herbicide application should not be washed in water sources used by humans and animals/to prevent pollution.
- Empty containers and left-overs should be properly disposed off in
- such a way that they will not pose danger to people, animals or the environment
- Avoid chemical spillage in places that are unintended/where it may cause danger to human and animals.
- Equipment used should be washed thoroughly to avoid damage to crops/animals in subsequent operations
- Avoid eating or handling food before washing (10 mks)

Advantages of using Herbicides

- (a) Herbicide application requires less labour than mechanical cultivation.
- (b) Herbicides are better adapted to the control of certain bothersome weeds such as Couch grass and other grasses including Sedges.
- (c) Use of herbicides does not disturb crop roots and other underground structures.
- (d) They make the control of weeds in certain crops such as wheat, barley and carrots easier.

cont

- e) Herbicide application is efficient in both wet and dry soil conditions which would not be the case with mechanical cultivation.
- (f) Herbicide application does not disturb the soil hence the soil structure is maintained. It is one way of facilitating minimum tillage.
- (g) They are more convenient to use in certain crops such as sisal and sugar-cane and also in controlling weeds such as double thorn and stinging nettle which may cause injury to the farmer.
- (h) It is cheaper in the long run than the use of manual or mechanical cultivation.

Disadvantages of using Herbicides

- (a) It requires skilled labour in mixing and application.
- (b) There are many risks to the environment and to the user.
- (c) Some herbicides have long residual effects which may interfere with future crops.

2. Mechanical Weed Control

- (a) Tillage (Cultivation)
- **Advantages of Tillage in Weed Control**
- (i) Tillage is cheap and therefore a good option for small scale farmers.
- (ii) Tillage opens up the soil allowing infiltration of water.
- (iii) During tillage, earthing up is done which encourages root growth.
- (iv) Helps to incorporate crop residue into the soil.
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Disadvantages

- (i) excessive tillage pulverizes soil thus destroying soil structure.
- (ii) Tillage creates suitable conditions for weeds to germinate.
- (iii) Is laborious and expensive in large scale farm
- (iv) Excessive cultivation may lead to water loss, soil erosion and damage to crop roots.
- (v) Tillage may not effectively control the weeds, especially the perennials.
- Not suitable in controlling weeds where crops are close e.g. wheat

(b) Slashing (mowing)

- This is the mechanical removal of shoots from weeds.
- Slashing is mainly effective in the control of annual weeds and especially when it is done repeatedly.

(c) Uprooting

- This is a practice mainly done where the weeds are scattered or where the crops are too close to allow mechanical cultivation.

3. Cultural Weed Control

- (a) Mulching- mulch smothers weeds, thus preventing weed growth.
- (b) cover cropping — The effects of cover crops are similar to those of mulch in that they smother the weeds.

- (c) **Crop rotation-** Some weeds only grow well when in association with certain crops; for example. striga grows only where some cereal crops and sugar-cane are growing. When these crops are rotated with dicots, striga does not germinate.
- (d) **Timely planting** — This allows crops to establish early before weeds, thus smothering them.

- **(e) Use of clean seed/planting materials** — This prevents the introduction of weeds to the farm land.
- F) **Proper spacing** — This helps to create little space for weed growth and forming a canopy which suppresses weeds.
- (g) **Clean seedbed** — This starts off the crops on a clean bed so that they effectively compete with weeds. This can be done by harrowing or spraying herbicide in a recently ploughed seedbed just before planting.
- (h) **Flooding** — This is mainly practiced in rice fields. Flooding discourages the growth of all non-aquatic weeds.

4. Biological Weed Control

- This is the use of living organisms to control weeds. The method is not reliable, however it is used in combination with other methods. Biological weed control methods include:
- (i) Use of livestock such as goats to graze and control the growth of weeds in plantation crops like coconuts and cashew nuts.
- (ii) Use of certain weed eating fish to control aquatic weeds.
- (iii) In some countries, moths have been used to control cactus.

5. Legislative Weed Control

- This method involves governmental laws and acts which prevent the introduction of noxious weeds in a country or the spreading of foreign weeds from one part of the country to another.
- There are certain laws that require seed producers and packers to specify the purity of the seeds.
- Imported materials such as seed, foods and clothes are tested to certify that they are weed free.
- However the limitation of this method is on the enforcement of the laws since only sample specimens are checked while the bulk of the materials may have some weed seeds.
- The Kenya Government has enacted a law to minimise this problem. This is known as the noxious weed law.

Noxious weed law

- In Kenya certain weeds are regarded as noxious and their cultivation is prohibited by law.
- The noxious weed law requires that such weeds be destroyed.
- Anybody found growing such weeds regarded as noxious is prosecuted
- An example of a noxious weed in Kenya is bhang (Cannabis Sativa).
- All imported plant materials are quarantined at the central quarantine base in Muguga where they are tested for purity before they are released.
- This is to ensure that no foreign weed seeds are introduced into the country.

Revision Exercises

- 1. What is a weed?
- 2. Name two poisonous weeds?
- 3. State at least five harmful effects of weeds to farm crops.
- 4. State five methods of controlling weeds.
- 5. Give five factors that affect the selectivity and effectiveness of herbicides.
- 6. What are the limitations of chemical weed control?
- 7. How does crop rotation control weeds?
- 8. State any three beneficial effects of weeds.