

Weed Management in Garden land and Dry land

N.K. Prabhakaran

Professor (Agronomy)

Department of Agronomy

TNAU, Coimbatore

Weeds

A weed is a plant growing where it is not wanted / not desired. It does not identify a particular portion of plant kingdom as weedy. A plant out of place (or) an undesirable plant or a plant with a negative value at that point of time and place. It depends upon the situation, in which the vegetation occurs.

Example

i. Bermuda grass - *Cynodon dactylon*

Foxtail grass - *Cenchrus ciliaris*

Goose grass - *Eleusine indica*

are valuable plants in pastures, but in field crops they are troublesome weeds.

i. Quack grass - *Agropyron repens* - very good soil binding plant on erodable lands, but weeds in auricle crop fields and orchards.

ii. Prickly pear - *Opuntia sp* is a biological fence, to bold fad in deserts, but in pastures and rangelands it is a weed.

So, by situation involving space and time, vegetation becomes weedy, but in nature there no weed. Corollary to the above definition of weeds, Weeds are plants growing in places and at times when we wanted either some other plants to grow or no plant to grow at all.

In other words, "**while all weeds are unwanted plants, all unwanted**

plants may not be weeds".

Weeds are unwanted and undesirable plants which interfere with the utilization of land and water resources and thus adversely affect human welfare.

Agricultural weeds may be defined as that part of the non-crop vegetation that reduces the quantity or quality of existing crops to such an extent that the loss cannot be compensated on crops.

Characteristics of weed

1. A concept of growing in an undesired location
2. Competitive and aggressive habits. 'A plant that grows so luxuriantly or plentifully that it chokes out all other plants that possess more valuable nutritive properties (Brenchley, 1926)
3. Of wild and rank growth.
4. Persistence and resistance to control or eradication. 'The predominance and pertinacity of weeds'.
5. Consisting often of large population, with abundant, rank and extensive growths.
6. Useless, unwanted and undesirable. "A plant not wanted and therefore to the destroyed.
7. Harmful to man, animals and crops.
8. Spontaneous growth, appearing without being sown or cultivated. - "A plant that grows spontaneously in a habitat that has been greatly modified by human action.
9. Of high reproducer capacity. - "Weeds produce vast numbers of propagates in proportion to plant size and possess highly effective methods of vegetative propagation.
10. Unsightly, with disfigurement of the land scale weed.

"A herbaceous plant not valued for use or beauty, growing wild and rank, and regarded as cumbering the ground or hindering the growth of superior vegetation - Dictionary.

Moose (1954)" a plant which interferes with mans utilization of land for a specific purpose".

Weeds in crop production

With the adoption of modern technologies in agriculture, Tamil Nadu stands as one of the leading producers in India. In the present day intensive agriculture, even though high yielding varieties respond very well to inputs, weeds still exist as a major problem to hamper the productivity of crops. The yield loss in crops is estimated to be 20 per cent by insects, 25 per cent by diseases, 15 per cent by storage pests and 6 per cent by rodents. However, weeds alone contribute about 33 per cent yield loss which accounts for nearly Rs.3,000 crores per annum.

- Reduction in crop yields

Loss in crop yields in advanced countries 5%.

Less developed countries it is 25%.

- Yield reduction in crores from 34 to 90%

Wheat	-	15 - 30 %
Rice	-	30 - 35%
Maize, Sorghum and Pulses	-	18 - 85%
Sugarcane	-	30 - 70%

Indirect losses

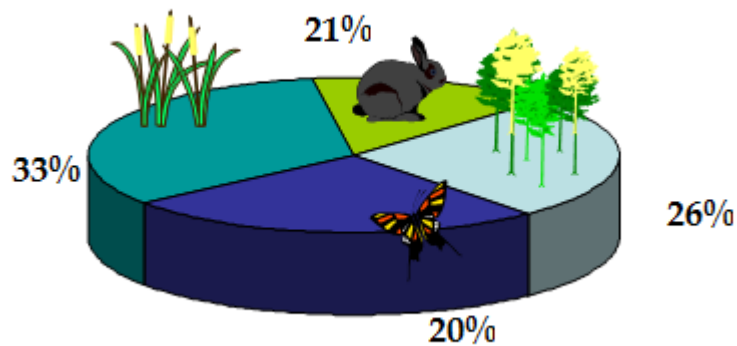
i. Application of fertilizer, pesticide and irrigation become difficult.

ii. Harvesting becomes difficult there weed e.g. *Xanthium sturmarium*.

Binding weeds - e.g. *Convolvulus arvensis*, Morning glories - *Ipomoea spp.* in cane fields.

iii. Quality of the produce e.g. Rice + *Eichnochloa spp* and Wheat + *Phlaris minor*.

Share of Losses Caused by Pests



Weeds in Animal maintenance

e.g. Animal feeds on weeds like *Argemone mexicana*, *oxalis sp.* and *Abutilon sp.* animal product - milk and meat get odd flavoure. Farm animals become Sick. e.g. *Sorghum halepense* at tillering stage. *Xanthium pungens* at cotyledon stage are poisonous to animals due to high prussic acid contents. Impairs the quality of wool and annoys animal. e.g. *X. Sturmarium*, *Tribulus terrestris*, *Achyranthus aspera*. Leaves of *Lantana camara* - cause Jaundice to animals *Parthenium hysterophorus* (cannot grass) - causes contact dermatitis in cattle. (Fig : 1)

Weeds on Human health

Weeds act as alternate hosts and vector of malaria, yellow fever.
e.g . *Alternanthera sp. Alternanthera triandra*
Argemone mexicana + mutant - blindness and death.

Weeds on aquatic ecosystem (Fig 2)

Concepts of weed management

1. Prevention - Weeds embodies all measures to deny the entry and establishment of new weeds in an area. Weed prevention includes measures to check the every year spread of even the existing weed species on the farm. It includes sanitation clean seeds by seed certification quarantines and cultural methods.

Weed prevention recommendations are:

1. Avoid crop seeds that are infested / contaminated with weed seeds for sowing.
 2. Avoid seeding farm animals with materials containing weed seeds.
 3. Avoid adding weeds and their seeds to manure pits.
 4. Clean the farm machinery like seed drills and ploughs
 5. Avoid the use of gravel, sand and soil from weed infested areas.
 6. Inspect nursery areas for the presence of weed seedlings, rhizomes, tubers etc.
 7. Keep irrigation channels, bunds and uncropped areas.
- Inspect the farm for any strange weed seedlings and destroy such weeds by digging deep and burring the weed along with its roots

2. Eradication

Destroying or removing the weeds and its propagules from the site of infestation weed eradication is the complete elimination of all live plant parts and seeds of a weed infestation from an area. It requires complete suppression or removed of seed and vegetative parts of a weed species in a defined area. Eradication is usually attempted only in small areas or areas with high value crops because of the difficulty and high costs associated with eradication practices. As such weed eradication is not a common practices except against certain noxious weeds like *Lantana camera*, *Saccharum species* and *Striga species* or *Cynodon dactylon* or *Cyperus species* which otherwise take thousands of hectares of land out of crop production.

3. Weed Control

It is the process of limiting any given weed infestation to the extent that it permits economic crop production. The primary objective is to limit the growth of undesired plants without any attempt to eliminate them form the scene.

The extent to which a given weed growth should be limited will depends on

- i. The goals of the people involved
- ii. Effectiveness of the weed control tool or tactics used
- iii. The abundance and tenacity of the weed species
- iv. The cost involved in the operation and the benefits anticipated from the operation

Important components or methods of weed management / control particularly in relation to agriculture are:

- i. Good crop husbandry methods

- ii. Physical destruction methods
- iii. Herbicidal management methods
- iv. Biological control methods

For sustainable agriculture we must develop and practice the concept of weed management in variance with the conventional weed control approach. While "weed control" aims at only putting down the weeds already present, by some kind of physical or chemical energy, "weed management" is a system approach whereby whole land use planning is done in advance to minimise the very invasion of weeds in aggressive forms and give crop plants a strongly, competitive advantage over the weeds. The main objective is to keep the over all weed population dynamics in view and plan long period strategies so as to gradually lower the occurrence of weeds on the farm. This system approach is called as integrate weed management.

Integrated weed management is defined as a method where by all economically, ecologically and toxicologically justifiable methods are employed to keep undesirable plants / weeds below the threshold level of economic damage, keeping in the for ground the continuous employment of natural limiting factors.

Principles of Integrated Weed Management

- i. Manipulation of crop habitat by utilizing some biological difference between the crops and weeds with the objective to place the crops in competitive advantage over weeds.
- ii. Measures should be directed to reduce the survival mechanism of weeds in soil.

iii. Crop husbandry practices should be incorporated which will discourage the establishment of colonies of perennial and parasitic weeds e.g. Crop rotations.

iv. Any individual element of weed management should be as far as possible eco-friendly i.e. it should not be detrimental to environment.

v. Any plan of weed management should be quite flexible to accommodate possible innovations and practical experiences.

I. Crop Husbandry method of weed management

There is no substitute to good crop husbandry methods in croplands these are referred as

Ecological management methods

vi. Good crop husbandry methods involve

vii. i. Selective stimulation of crops

viii. ii. Stale seed beds

ix. iii. Crop rotations

x. iv. Summer fallowing

xi. v. Competitive cropping

xii. vi. Suitable time and method of planting crops

II. Physical control of weeds

Physical methods of weed control utilize manual energy, animal power, or implements that dig out weeds - i) Manual ; ii) Mechanical methods are termed as non - chemical methods. The implements used for physical control of weeds vary from simple hand tools to complex, multi tined weeding machines run by tractors. Manual weed control is a labour intensive method. Limitations are the presence of too wet or too dry soil condition at the time of weeding.

Tillage or hand weeding fragments the rhizomes and roots of the perennial weeds, which give rise to new plants.

Principles and methods of weed management: Chemical, Biological and Alternate methods

III. Herbicidal control of weeds

Herbicides are chemicals capable of killing or inhibiting the growth of plants (or) Herbicides are synthetic chemicals used to kill or suppress unwanted vegetation. More than 150 herbicides are in use for selective and non - selective weed control in different areas. Herbicides vary in their a) molecular structures ; b) mobility within plants ; c) selectivity ; d) fate of herbicide in soils, e.g. response to environment.

Advantages or reasons for success of herbicide usage are:

1. During monsoon seasons incessant rains may make mechanical or manual weeding in accessible, where herbicides can be a better alternative.
2. Herbicides can be employed to control weeds as they emerge from the soil to eliminate crop weed interference even at very early stage of crop growth. i.e. herbicides provide benefits of timely weed control.
3. Herbicide can kill many weeds that survive by mimicry. E.g. wild oat in wheat, Barnyard grass in rice.
4. Herbicidal control does not dictate strict crop row spacing as warranted for mechanical or manual methods.
5. Herbicide brings about long lasting control of perennial weeds by translocating it in to deeper underground parts of weeds.
6. Herbicides are convenient to use on spiny and objectionable weeds like *Argemone mexicana*, *Tribulus terrastris* or *Datura speciosa*.

7. Herbicides are safe on erodible lands where tillages may accelerate soil and water erosion by altering soil structure, reducing organic matter and depleting moisture status of the soil
8. Herbicides kill weeds in situ without permitting their dissemination as in tillage or manual methods.
9. Herbicides spray reach easily the weeds growing in obstructed situations like under trees, un developing lands.
10. Herbicide usages reduce labour problem, greater possibility of farm mechanization, easier crop harvesting and lower cost of farm operations.

Herbicides selection, time and method and rate of application skills are prerequisites for farmers. Crop selection and intercropping with various crops are restricted. Herbicides drift wash-off and runoff can cause considerable damage to neighboring crops.

IV. Biological control of weeds

The biological control of weeds involves the use of living organisms such as insects, herbivores, fish, other animals, disease causing organisms and competitive plants to limit weed infestations.

Biological weed control is the use of living organisms to lower the population level or competitive ability of a weed species so that it is no longer an economic problem.

Biological methods differ from other methods in many ways:

1. It does not necessarily kill the weeds out light only competitive or reproducer ability of weeds is reduced.
2. It may be slow acting, requires years to achieve acceptable control not be attempted on weeds for immediate control.

3. It is relatively expensive especially in contrast to the high costs of developing herbicides.
4. Biological control is selective it is more advantageous in mono weed dominating areas than in multiple weed composition areas.
5. Because of its high host specificity. It may not cause harmful side effects.
6. Biological weed control is often permanent but it does not eradicate the weed. i.e. some weed populating should always be present to maintain a population of natural enemy. Such control is permanent once the weed and natural enemy populations are in equilibrium.

Biological control has been most useful when i) current control measures are inadequate, ii) land values are low; iii) No closely related crops or other plants of economic or ecological importance are present within the region of weed infestation.

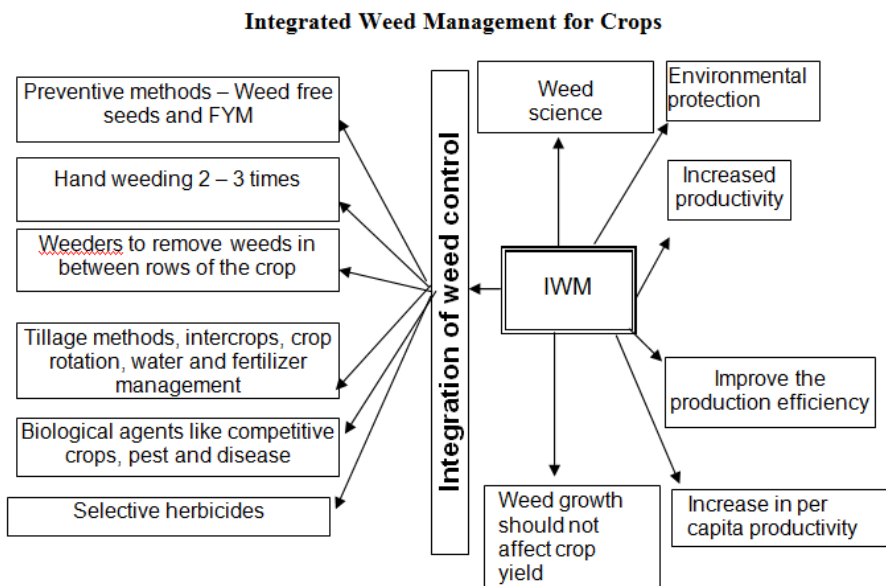
Integrated Weed Management

Integrated weed management is defined as the use of multiple strategies to manage weed populations in an economically and environmentally sound manner. Strategies include culture, mechanical, chemical and biological methods.

The following strategies can be followed for efficient weed management.

- ❖ Use of weed free seeds
- ❖ Keeping the bunds, irrigation channels, drainage channels etc., free of weeds
- ❖ Summer ploughing
- ❖ Selection of suitable crops and varieties

- ❖ Maintenance of optimum plant population
- ❖ Intercrops and mulching
- ❖ Suitable crop rotation
- ❖ Use of proper weed control implements
- ❖ Optimum dose and time of application of selective herbicides
- ❖ Integrated weed management based on the ecosystem.



Gardenland and dryland weeds

Predominant Gardenland weeds

Grasses: *Dactyloctenium aegyptium*, *Cynodon dactylon*, *Panicum repens* and *Chloris barbata*

Sedges: *Cyperus rotundus*, *Bulbostylis barbata*, *Fimbristylis miliaceae*

Broad leaved weeds: *Trianthema portulacastrum*, *Amaranthus viridis*, *Celosia argentea*, *Digera arvensis*, *Euphorbia hirta*, *Acalypha indica*, *Corchorus olitorius*, *Eclipta alba*, *Portulaca oleracea*, *Portulaca quadrifida* and *Boerhaavia diffusa*

Predominant dryland weeds

Grasses: *Andropogon contortus*, *Perotis indica*, *Dactyloctenium aegyptium*, *Cynodon dactylon* and *Panicum repens*

Sedges: *Cyperus rotundus* and *Fimbristylis miliaceae*

Broad leaved weeds: *Abutilon indicum*, *Acanthospermum hispidum*, *Achyranthes aspera*, *Aerva lanata*, *Amaranthus spinosus*, *Aristolochia bracteata*, *Borreria hispida*, *Cleome viscosa*, *Leucas aspera*, *Tephrosia spinosa* and *Solanum elaeagnifolium*

Integrated Weed Management for Gardenland and Dryland Crops

Irrigated sorghum

Pre-emergence spraying of atrazine 0.5 kg or alachlor 2.0 l / ha on 3 days after sowing followed by hand weeding on 30 – 35 DAS or Pre-emergence spraying of atrazine 0.5 kg followed by 2,4 D sodium salt 1.25 kg/ha on 25 DAS

If pulse is an inter-crop, instead of atrazine spray alachlor 2.0 l or pendimethalin 3.3 l / ha on 3 DAS.b (Fig:3)

Rainfed sorghum

Spray atrazine 0.5 kg / ha on 3 DAS if adequate moisture is available in the soil.

If pulse is an intercrop, spray pendimethalin 3.3 l / ha on 3 DAS if adequate soil moisture available.

Pearl millet

Spray atrazine 0.5 kg / ha on 3 DAS followed by one hand weeding on 30 – 35 DAS. If herbicide is not applied, hand weeding has to be done on 10 - 15 and 30 - 35 DAS or T. (Fig 4)

Ragi

Spray butachlor 2.5 l/ha or pendimethalin 2.5 l / ha or Oxyfluorfen 210 ml/ha on 3 DAS.

If herbicide is not applied, hand weeding has to be done on 10 and 20 DAT.

For rainfed direct seeded crop, spray post emergence herbicide 2,4-D sodium salt at 625 g / ha on 10 DAS depending on the moisture availability. (Fig 5)

Irrigated Maize

Spray atrazine 0.5 kg / ha on 3 DAS followed by one hand weeding (or) weeding with twin wheel hoe weeder in between the rows and hand weeding within rows on 35 DAS or Pre-emergence spraying of atrazine 0.5 kg followed by 2,4 D sodium salt 1.25 kg/ha on 25 DAS

If pulse is an inter-crop, spray alachlor 2.0 l or pendimethalin 3.3 l / ha within 3 DAS.

If turmeric is an inter crop, spray pendimethalin 2.5 L + atrazine 0.5 kg / ha on 3 DAS.

If herbicide is not applied, hand weeding has to be done on 15 - 20 and 40 - 45 DAS.

Rainfed maize

Spray pendimethalin 3.3 L or atrazine 0.5 kg/ha on 3 DAS followed by hand weeding on 30 - 35 DAS or spray 2,4-D sodium salt 1.0 kg / ha on 30 DAS.

Pulses

(Red gram, Black gram, Green gram, Cowpea and Bengal gram)

Spray pendimethalin 3.3 l / ha within 3 DAS with sufficient soil moisture followed by one hand weeding on 30 – 35 DAS or Quizalofop ethyl 1.0 l/ha for grass weeds or Imazethapyr 500 ml/ha for broad leaf weeds on 15-20 DAS

If herbicide is not applied, hand weeding has to be done on 15 and 30 DAS. (Fig 6)

Soybean

Spray alachlor 2.0 l or pendimethalin 3.3 l /ha within 3 DAS followed by hand weeding on 30 DAS or Quizalofop ethyl 1.0 l/ha for grass weeds or Imazethapyr 500 ml/ha for broad leaf weeds on 15-20 DAS

If herbicide is not applied, hand weeding has to be done on 20 and 35 DAS.

Groundnut

Spray pendimethalin 3.3 l / ha or alachlor 2.0 l/ha within 3 DAS followed by hand weeding on 35 – 40 DAS or Quizalofop ethyl 1.0 l/ha for grass weeds or Imazethapyr 500 ml/ha for broad leaf weeds on 15-20 DAS

If herbicides are not applied, hand weeding has to be done on 20 and 40 DAS.

Rainfed Groundnut

Oxadiazon 800 g/ha or Oxyfluorfen 850 ml/ha or Metalachlor 6.6 l/ha on 3 DAS or Quizalofop ethyl 1.0 l/ha for grass weeds or

Imazethapyr 500 ml/ha for broad leaf weeds on 15-20 DAS ensuring that there will be adequate moisture in the soil at the time of herbicide application.

Sesamum

Spray alachlor 2.5 l / ha or pendimethalin 2.5 l / ha within 3 DAS followed by hand weeding on 30 – 35 DAS.

If herbicide is not applied, hand weeding has to be done on 15 and 30 DAS.

Castor

Spray alachlor 2.5 l or pendimethalin 3.3 l / ha on 3 DAS followed by hand weeding on 30 – 35 DAS (or) hand weeding on 20 and 40 DAS.

Sunflower

Pre-emergence spraying of pendimethalin 3.3 l / ha within 3 DAS followed by hand weeding on 30 – 35 DAS.

If herbicide is not sprayed, hand weeding has to be done on 15 and 30 DAS.

Cotton

Irrigated and rice fallow cotton If herbicides are not applied, hand weeding has to be done on 18 – 20 and 40 – 45 DAS.

Rainfed cotton

Spray pendimethalin 3.3 l/ ha on 3 – 5 DAS with adequate soil moisture. If herbicides are not applied, hand weeding has to be done on 15 – 20 and 40 – 45 DAS.

Sugarcane

Spray atrazine 2.0 kg or oxyfluorfen 0.75 l / ha on 3 days after planting (DAP).

Spray 2,4-D sodium salt 1.6 kg / ha on 21-30 DAP

Spray paraquat 2.5 L + 2,4-D sodium salt 2.5 kg / ha on 21-30 DAP
Spray Glyphosate 2.4 l/ha as directed spray on 21-30 DAP

If pulse is an inter-crop, spray pendimethalin 3.3 l / ha on 3 DAP.

If the parasitic weed *striga* sp. is a problem, pre-emergence spraying of atrazine 2.0 kg / ha on 3 DAP. Hand weeding on 45 DAP followed by earthing up on 60 DAP. Spray 2,4-D sodium salt 6 g or urea 200 g / l of water on 90 DAP. Mulching with sugarcane trash 5 t / ha on 120 DAP.

If herbicide is not applied, inter cultivate with junior-hoe along with ridges on 25, 55 and 85 DAP for removal of weeds and proper stirring. Remove the weeds along the furrow with hand hoe.

Tobacco

Spray oxyfluorfen 0.5 l / ha before 1 week of planting or pendimethalin 3.3 l / ha on 3 – 5 DAP followed by hand weeding on 45 DAP and earthing up.

If the parasitic weed *orobanche* sp is a problem, remove before flowering and burry into the soil or burn it. Greengram or sesamum or sorghum can be grown as intercrop to have allelopathic effect on *Orobanche* sp. Plant hole application of neem cake 200 kg / ha on 30 DAT.

IWM IN HORTICULTURAL CROPS

Fruit crops

In the wide spaced fruit crops like mango, jackfruit, banana, lemon, guava, sapota, papaya, pomegranate and ber. ploughing should be done twice during monsoon seasons before the weeds produce seeds.

If ploughing is not done, spraying of paraquat 10 ml / l of water before flowering of weeds.

For perennial and problematic weeds like *Cyperus* sp. and *Cynodon* sp. spray glyphosate 15 ml with ammonium sulphate 20 g and mixed with soap solution 2 ml / l of water when the weeds are in 3 – 4 leaf stage.

Coconut

To control weeds in coconut plantation, ploughing should be done twice a year or spraying of paraquat 10 ml / l of water on the weeds before flowering.

If *Cynodon* and *Cyperus* problem is there spray glyphosate 15 ml with ammonium sulphate 20 g and soap solution 2 ml/l of water when the weeds are in 3 – 4 leaf stage.

Vegetables

For vegetables like tomato, brinjal, chillies and bhendi, spray alachlor 3.7 l or pendimethalin 3.3 l / ha or oxyfluorfen 0.65 -0.85 l/ha or oxadiazon 0.80 kg/ha on 3 DAS followed by hand weeding on 45 DAS.

Onion

Spray alachlor 3.75 l or pendimethalin 3.3 l or fluchloralin 2.0 l / ha within 3 DAT. If necessary hand weeding can be done on 40 – 45 DAT or spraying of oxyfluorfen 0.65 l or oxadiargil 0.80 kg or metribuzin 0.75 kg/ha.

Cassava

Spray alachlor 3.75 L or pendimethalin 3.3 l/ha within 3 DAP followed by hand weeding on 60 DAP or hand weeding on 30, 60 and 90 DAP.

If *cyperus* sp. is a problem spray pre-emergence herbicide followed by post-emergence directed application of glyphosate 10 ml with ammonium sulphate 20 g and soap solution 2 ml on 60 DAP as directed spray.

Turmeric

Spray alachlor 3.75 l/ha or pendimethalin 3.3 l / ha or metribuzin 1.0 kg/ ha within 3 DAP followed by hand weeding and earthing up on 45 – 50 and 70 - 75 DAP.

Important Note:

- ❖ Quantity of herbicides mentioned above is for commercial product
- ❖ While spraying pre-emergence herbicides sufficient moisture should be in the field
- ❖ Herbicides should be always sprayed with knapsack sprayer with deflector / fan type nozzle.

Problematic Weed Management in garden and dryland

***Cynodon dactylon* and *Cyperus* spp.**

1. Summer ploughing
2. Tubers should be collected and removed off from cropping area
 1. Crop rotation with rice and cowpea
 2. Intercropping with field bean

Glyphosate applied as post-emergence at 10 - 15 ml per litre of water along with Ammonium sulphate at 20 g

Parthenium hysterophorus

Herbicide application

· Post emergence application of Glyphosate (15 ml) +Ammonium sulphate (20 g) and 2 ml soap solution / litre of water

· Post emergence application of 2,4-D 8 g / litre of water

Post emergence application of Metribuzin 3 g / litre of water

Biological Control

Release of Mexican beetles to infested areas

Leaf rust affects *Parthenium* and weakens the plant

Growing of competitive plant viz., *Abutilon*, *Cassia* and *Cleome gynandra*

Control of parthenium before flowering reduces the chances of new seed production

Ipomoea carnea

1. Manually or using machineries *Ipomoea* in canals would be removed.
2. 2, 4-D Na salt at 8 g along with 20 g urea and soap solution at 1 ml / l mixed well and then sprayed on the weed. After which the dried weeds should be collected and burns.
3. Only, well decomposed *Ipomoea* should be applied to the field to avoid the spread.

Solanum elaeagnifolium

- Deep ploughing should be avoided since it spreads vegetatively through roots
- Collection of root stores and burning
- Wearing clothes for manual removing as the weed is thorny nature

- If water availability is adequate the land may be converted to wetland for rice cultivation
- Cover the soil using sugarcane trash, coirpith waste and any crop residues.
- 2,4-D sodium 8 g or glyphosate at 10 ml / litre of water when the land was fallow

Parasitic Weed Management in gardenland

Orabanche

1. Deep ploughing
2. Application of weeds cake
3. Application of more amount of N fertilizer
4. Crop rotation : cultivating sorghum, chilly, cowpea, cotton and sunflower
5. Through wetting of *Orabanche* using kerosene or any botanicals
6. Spraying of glyphosate at 10 ml per litre of water of *Orabanche* - parasitic weed in tobacco

Cuscuta

1. Clean and quality certified seeds
2. Crop rotation with maize, field bean
3. Hand weeding
4. Pre-emergence application of pendimethalin at 0.5 kg ha⁻¹
5. Glyphosate 10 ml with 20 g ammonium sulphate / litre of water sprayed post-emergence would control cuscuta.

Management of Parasitic weeds in *Striga asiatica*

Glyphosate 10 ml + AGF activator 2 ml / lit of water or

Glyphosate 15 ml + 20 gm Am.Sulphate / lit of water

Approach : Post emergence, total, translocative herbicide ; Stage of weed : Active growing, pre flowering stage

Pre-emergence application of atrazine 1.0 kg/ha on 3rd day after planting (DAP) + Hand weeding on 45 DAP with an earthing up on 60 DAP combined with post-emergence spraying of 2,4-D sodium salt 6g + urea 20g / litre on 90 DAP + Trash mulching 5 t / ha on 120 DAP for complete control of *Striga asiatica*

Loranthus

1. Infested branch should be cut down and burnt
2. on the cut portion of branch, 2, 4-D sodium herbicide should be swabbed at 1 – 2%
3. 0.1 metribuzin injected on the stem portion
4. Shielding the tree leaves, glyphosate at 0.1% would be directly sprayed on the parasitic / *Loranthus* leaf