

## ANSWER KEY

### Unit 1: Irrigation Management in Vegetable Crops

#### Session 1: Irrigation and Water Quality

##### A. Fill in the blanks

1. element
2. frequent, more water
3. poor
4. 6.5-8.5

##### B. Multiple choice questions

1. (a)
2. (a)
3. (c)
4. (d)
5. (a)

##### D. Match the columns

1. (d)
2. (c)
3. (e)
4. (a)
5. (b)

#### Session 2: Water Requirement and Irrigation Methods

##### A. Fill in the blanks

1. irrigation scheduling
2. critical stage
3. border irrigation
4. overhead irrigation
5. bulb formation stage
6. emitters or drippers
7. drip irrigation

##### B. Multiple choice questions

1. (a)
2. (c)
3. (a)
4. (c)
5. (d)

##### D. Match the columns

1. (c)
2. (d)
3. (a)
4. (e)
5. (b)

### Unit 2: Weed Management in Vegetable Crops

#### Session 1: Weeds in Vegetable Crops

##### A. Fill in the blanks

1. weeds
2. two seed leaves
3. annual
4. Perennial
5. grassy

##### B. Multiple choice questions

1. (b)
2. (d)
3. (a)
4. (a)
5. (b)

##### D. Match the columns

1. (c)
2. (e)
3. (a)
4. (b)
5. (d)

## NOTES

### Session 2: Weed Management

#### A. Fill in the blanks

1. intercropping
2. 44–50
3. crop rotation
4. hand weeding
5. post-emergence

#### B. Multiple choice questions

1. (b)      2. (b)      3. (d)      4. (c)      5. (a)

#### D. Match the column

1. (e)      2. (d)      3. (a)      4. (b)      5. (c)

### Unit 3: Integrated Pest and Disease Management in Vegetable Crops

#### Session 1: Major Insect-pests of Solanaceous Crops

#### A. Fill in the blanks

1. African marigold
2. tomato aphids
3. leaf miner
4. curl upwards
5. mites
6. shoot and fruit borer

#### B. Multiple choice questions

1. (b)      2. (a)      3. (c)      4. (b)      5. (d)

#### D. Match the columns

1. (e)      2. (a)      3. (b)      4. (c)      5. (d)

#### Session 2: Major Diseases of Solanaceous Crops

#### A. Fill in the blanks

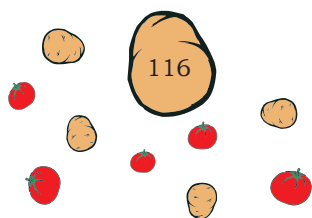
1. Damping off
2. Little leaf of brinjal
3. die-back
4. nematodes
5. virus

#### B. Multiple choice questions

1. (a)      2. (d)      3. (c)      4. (b)

#### D. Match the columns

1. (c)      2. (d)      3. (e)      4. (a)      5. (b)



Session 3: Integrated Pest and Disease Management of Solanaceous Crops

NOTES

**A. Fill in the blanks**

1. diamond black moth
2. brinjal
3. trap crop
4. nitrogen
5. male
6. fruit flies
7. predator

**B. Multiple choice questions**

1. (b)      2. (c)      3. (a)      4. (a) 5. (a)

**D. Match the columns**

1. (c)      2. (d)      3. (e)      4. (b) 5. (a)

**Unit 4: Harvest and Post-harvest Management**

Session 1: Maturity Standards and Harvest of Solanaceous Crops

**A. Fill in the blanks**

1. physiological maturity
2. tomato and muskmelon
3. non-climacteric
4. morning, evening

**B. Multiple choice questions**

1. (b)      2. (a)      3. (a)      4. (b) 5. (a)

**D. Match the columns**

1. (b)      2. (c)      3. (d)      4. (e) 5. (a)

Session 2: Post-harvest Handling of Solanaceous Vegetable Crops

**A. Fill in the blanks**

1. pre-cooling
2. 100–150
3. cold chain
4. packaging

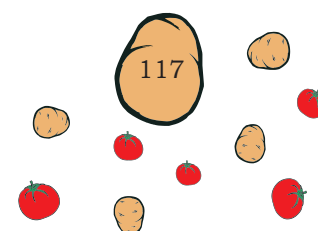
**B. Multiple choice questions**

1. (c)      2. (b)      3. (c)      4. (c) 5. (d)

**D. Match the columns**

1. (e)      2. (d)      3. (c)      4. (b) 5. (a)

ANSWER KEY



## NOTES

### Unit 5: Basic Farm Management

Session 1: Farm Management and Selection Criteria of Vegetable Crops

#### A. Fill in the blanks

1. fixed costs and variable costs
2. single entry system
3. double entry system
4. processing unit
5. storage

#### B. Multiple choice questions

1. (b)
2. (a)
3. (b)
4. (a)
5. (b)

#### D. Match the columns

1. (c)      2. (d)      3. (e)      4. (b)      5. (a)

Session 2: Basic Market Information

#### A. Fill in the blanks

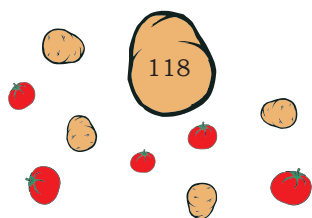
1. 1, 2
2. demand and supply
3. Agricultural and Processed Food Products Export Development Authority
4. market intelligence system
5. October 2, 1958

#### B. Multiple choice questions

1. (d)      2. (a)      3. (d)      4. (b)

#### D. Match the columns

1. (d)      2. (c)      3. (b)      4. (e)      5. (a)



## GLOSSARY

- Admixture:** *mixing an ingredient with something else.*
- Adulteration:** *addition of a substance, which may result in the loss of actual quality.*
- Alternate host:** *an organism that serves as a temporary host in the absence of host.*
- Barrier crop:** *a tall growing crop that inhibits insects from flying over.*
- Biochemical:** *a chemical process, that occurs in living organisms.*
- Bioherbicide:** *an organism that is toxic to unwanted vegetation and is used to destroy weeds.*
- Bulbs:** *a round underground storage organ. It is present in some plants. It consists of a short stem surrounded by fleshy scale leaves or leaf bases.*
- Bulldgy:** *a protruding part with an outward curve or swelling.*
- Cochineal insects:** *a scarlet dye used for colouring food, made from the crushed dried bodies of a female scale insect.*
- Coir:** *fibre from the outer husk of a coconut.*
- Concentric rings:** *rings with a common centre.*
- Conservation:** *preservation, prevention.*
- Corms:** *it is the same thing as a bulb.*
- Cost of cultivation (Rs/ha):** *the expenditure incurred from field preparation to harvest is calculated at rupees per hectare.*
- Depletion:** *exhaustion*
- Determinate type:** *plants, such as tomato, that terminate in flower buds, self topping type.*
- Diffusion:** *the movement of molecules from high to low concentration.*
- Disperse:** *spreading something over a large area.*
- Disseminate:** *spread, circulate, distribute.*
- Dormant:** *resting period. Not active.*
- Dumping:** *deposit or dispose of waste carelessly.*
- Entomopathogenic:** *pathogenic to insects.*
- Eradicate:** *destroy completely, put an end to, eliminate.*
- Evapo-transpiration:** *the process by which water is transferred to the atmosphere. It could be by evaporation from the soil and other surfaces and by transpiration from plants.*
- Fertigation:** *it is the process of direct application of water soluble solid fertilisers or liquid fertilisers with irrigation water.*
- Fungicides:** *it is a substance or chemical used to kill or control fungi.*
- Gross returns (Rs/ha):** *the yield is computed per hectare and the total income worked out at rupees per tonne according to the prevailing market price.*

## NOTES

**Heavy metal:** a metal of relatively high density or high relative atomic weight.

**Herbaceous:** tender, grassy.

**Homogenous:** denoting a process involving substances in the same phase.

**Indeterminate type:** tall (vine like) growing varieties.

**Infestation:** an unusually large number of insects present in a particular place or host.

**Insect:** a small animal of the insect class with three pairs of legs, two pair of wings, and body divided into three segments head, thorax and abdomen.

**Insecticides:** a substance or chemical used to kill or control insects.

**Insulate:** protect from heat, cold or noise.

**Irrigation interval:** a break in the number of days between two consecutive irrigations during the critical period of consumptive use of the crop. The interval depends on the crop, soil and climate.

**Irrigation scheduling:** is the frequency of water application in which water is to be applied based on the needs of the crop and nature of the soil.

**Maturity indices:** measurement that can be used to determine whether a particular commodity is mature.

**Mulching:** applying coarse plant residue or chips, or other suitable material, to cover the soil surface. It reduces evaporation from soil surface and weed growth.

**Myco-herbicide:** fungus or fungi used to destroy weeds.

**Nematicides:** chemicals that control nematodes.

**Net returns (Rs/ha):** obtained by subtracting the cost of cultivation from gross returns for each treatment and expressed as rupees per hectare.

**Osmosis:** a fluid, usually water, passing through a semi-permeable membrane into a solution where the solvent concentration is higher.

**Parasite:** an organism which lives in or on another living organism (its host) and benefits by drawing nutrients at the other's expense.

**Parasitoid:** an insect whose larva lives as a parasite and eventually kills the host.

**Pathogens:** any organism that causes disease in another organism.

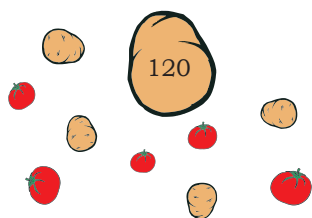
**Permeable:** a material or membrane that allow liquid or gas to pass through it.

**Pest:** a destructive being that attacks crop, livestock, food, etc.

**Pesticide:** a substance used to control pests.

**Pheromone trap:** a trap that uses pheromones to lure insects.

**Pheromone:** a chemical that is secreted or excreted to trigger a social response in members of the same species.



**Photosynthesis:** a process in which green plants convert solar energy into chemical energy and later release it as fuel.

**Physiology:** a branch of biology that deals with the functions and activities of living organisms and their parts, including all physical and chemical processes.

**Phytotoxic:** lethal to plants

**Porous:** material having minute interstices (spaces) through which liquid or air can pass.

**Predator:** an organism that preys on other organisms.

**Residue:** something that remains after use; remainder.

**Respiration:** inhalation and exhalation of air by a living organism.

**Rhizomes:** a continuously growing horizontal underground stem, which puts out lateral shoots and adventitious roots at intervals.

**Scars:** marks of injuries.

**Shelf life:** the length of time for which an item remains usable or fit for consumption.

**Sodium Absorbance Ratio (SAR):** it is an irrigation water quality parameter to determine the concentration of ions of sodium and calcium plus magnesium content in the water.

**Soil borne:** inhabitant of soil; lives and grows in soil.

**Solarisation:** using solar power for controlling pests.

**Succulent:** a plant having thick fleshy leaves or stems adapted to storing water; juicy.

**Sunken spot:** a spot that is deeper in the centre and shallow on the outer sides.

**Systemic insecticides:** insecticides translocated to various parts of the plant irrespective of the part applied to.

**Thuricide (*Bacillus thuringiensis*):** a liquid formulation of bacteria that controls caterpillars, loopers, etc.

**Trap crop:** a crop that you add to your garden to attract pests away from the main crop.

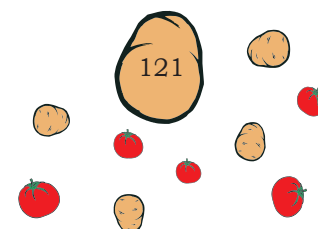
**Trimming:** to put into a neat or orderly condition by clipping.

**Tubers:** a much thickened underground part of a stem.

**Vacuum:** a region with gaseous pressure much less than the atmospheric pressure.

**Vectors:** carrier of pathogens.

**Viable:** able to germinate or grow.



## LIST OF CREDITS

### Unit1: Irrigation Management in Vegetable Crops

- Fig. 1.1 : Sources of irrigation water  
Courtesy : DAAH, PSSCIVE, Bhopal
- Fig.1.2 : pH colour strip scale  
Courtesy : DAAH, PSSCIVE, Bhopal
- Fig.1.3 : Digital pH meter  
Courtesy: Prof. R K Pathak, DAAH, PSSCIVE, Bhopal
- Fig.1.4 : Digital Electrical Conductivity (EC) meter  
Courtesy : <https://bit.ly/2WLpwdG>
- Fig.1.5 : Irrigation systems and methods  
Courtesy : DAAH, PSSCIVE, Bhopal
- Fig.1.6 : Flood irrigation method  
Courtesy : DAAH, PSSCIVE, Bhopal
- Fig.1.7: Border irrigation method  
Courtesy : DAAH, PSSCIVE, Bhopal
- Fig.1.8 : Line diagram of check basin irrigation method  
Courtesy : DAAH, PSSCIVE, Bhopal
- Fig. 1.9 : Line diagram of ring and basin irrigation methods  
Courtesy : DAAH, PSSCIVE, Bhopal
- Fig. 1.10 : Furrow irrigation method  
Courtesy : <https://bit.ly/2E9okKV>
- Fig.1.11a: View of sprinkler or overhead irrigation system  
Courtesy : <https://bit.ly/2pcDdEj>
- Fig.1.11b: View of sprinkler or overhead irrigation system  
Courtesy : <https://bit.ly/2D3GqQi>
- Fig.1.11c: View of sprinkler or overhead irrigation system  
Courtesy : <https://bit.ly/2NibMHn>
- Fig.1.11d: View of sprinkler or overhead irrigation system  
Courtesy : <https://pxhere.com/en/photo/765816>
- Fig.1.12 : Components of drip irrigation system  
Courtesy : DAAH, PSSCIVE, Bhopal
- Fig. 1.13 : Component and layout of drip irrigation system  
Courtesy : <https://bit.ly/2MPyenZ>

### Unit 2: Weed Management in Vegetable Crops

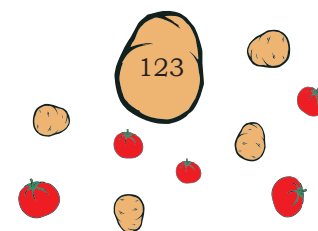
- Fig. 2.1 : Broadleaf weeds, Camphor grass (*Chromolaena odorata*)  
Courtesy : <https://bit.ly/2NioiH2>
- Fig. 2.2 : Grassy weeds Johnsongrass (*Sorghum halepense*)  
Courtesy: <https://bit.ly/2Nlj0dO>
- Fig.2.3 : Amaranth (*Amaranthus viridus*)  
Courtesy : <https://bit.ly/2pFGOG>
- Fig. 2.4 : Common Crabgrass (*Digitaria sanguinalis*)  
Courtesy : <https://bit.ly/2xqfJPI>

- Fig.2.5 : Bathua or Pigweed (*Chenopodium album*)  
Courtesy : <https://bit.ly/2NkcGmI>
- Fig.2.6 : Field bindweed or Hirankhuri (*Convolvulus arvensis*)  
Courtesy : <https://bit.ly/2pcW55Z>
- Fig.2.7 : Amaranth (*Amaranthus viridus*)  
Courtesy : <https://bit.ly/2D5Pkwz>
- Fig.2.8 : Satyanashi or Mexican poppy (*Argemone mexicana*)  
Asthma Plant (*Euphorbia hirta*)  
Courtesy : <https://bit.ly/2xjavG7>
- Fig.2.9 : Bathua or Pigweed (*Chenopodium album*)  
Courtesy : <https://bit.ly/2QCnURS>
- Fig.2.10 : Creeping thistle (*Cirsium arvense*)  
Courtesy : <https://bit.ly/2Nk4hA2>
- Fig.2.11 : Doob grass or Bermuda (*Cynodon dactylon*)  
Courtesy : <https://bit.ly/2QzAPnn>
- Fig.2.12 : Purple nut sedge or Motha (*Cyperus rotundus*)  
Courtesy : <https://bit.ly/2MEg9aQ>
- Fig. 2.13 : Bishkhapra (*Boerhavia difusa*)  
Courtesy : DAAH, PSSCIVE, Bhopal
- Fig. 2.14 : Methods of weed control  
Courtesy : DAAH, PSSCIVE, Bhopal
- Fig. 2.15 : Types of Herbicides  
Courtesy : DAAH, PSSCIVE, Bhopal
- Fig. 2.16 : Knapsack sprayer  
Courtesy : <https://bit.ly/2E9p2YB>

### Unit 3: Integrated Pest and Disease Management in Vegetable Crops

- Fig 3.1 : Whiteflies in tomato  
Courtesy : <https://bit.ly/2WOMYap>
- Fig 3.2 : Aphids in tomato  
Courtesy : <https://bit.ly/2ZmHC7v>
- Fig 3.3 : Leaf hopper in brinjal  
Courtesy : <https://bit.ly/2MKKWic>
- Fig 3.4 : Aphids in brinjal  
Courtesy : <https://bit.ly/2Q1rIfq>
- Fig.3.5 : Early blight of tomato  
Courtesy : <https://bit.ly/2MFLXfk>
- Fig.3.6 : Late blight of tomato  
Courtesy : <https://bit.ly/2PZVkJf>
- Fig.3.7 : Leaf curl in tomato  
Courtesy : <https://bit.ly/2Nm7i2R>
- Fig.3.8 : Root knot in tomato  
Courtesy : <https://bit.ly/2MHFUqR>
- Fig.3.9 : Phomopsis blight in brinjal

LIST OF CREDITS



## NOTES

Courtesy : <https://bit.ly/2NgLbul>

Fig.3.10 : Little leaf in brinjal

Courtesy : <https://bit.ly/2NjbxvR>

Fig.3.11 : Cercospora leaf spot in Brinjal

Courtesy : <https://bit.ly/2NRKkzK>

Fig.3.12 : Fusarium wilt in tomato

Courtesy : <https://bit.ly/2Ousqvv>

Fig.3.13 : Integrated pest management (IPM)

Courtesy : DAAH, PSSCIVE, Bhopal

Fig.3.14 : Biological pest control

Two spotted lady beetle (*Adalia bipunctata*) feeding amongst aphid colony

Courtesy : <https://bit.ly/2VIHZg9>

Fig.3.15 : Biological pest control (The parasitoid wasp *Adalia bipunctata* laying eggs on a caterpillar)

Courtesy : <https://bit.ly/2xkikLG>

### Unit 4: Harvest and Post-harvest Management

Fig. 4.1 : Maturity indices of solanaceous vegetable crops

Courtesy : DAAH, PSSCIVE, Bhopal

Fig. 4.2 : A view of maturity stages in tomato

Courtesy : DAAH, PSSCIVE, Bhopal

Fig. 4.3 : Maturity stages of tomato

Courtesy : DAAH, PSSCIVE, Bhopal

Fig.4.4 : Harvesting container (Plastic crates)

Courtesy : DAAH, PSSCIVE, Bhopal

Fig. 4.5 : Methods of pre-cooling

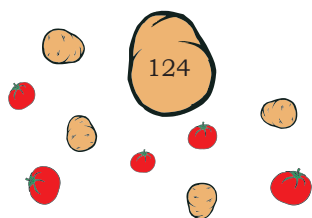
Courtesy : DAAH, PSSCIVE, Bhopal

Fig.4.6 : Packing in the field and transport to packing house

Courtesy : DAAH, PSSCIVE, Bhopal

Fig.4.7 : Corrugated cardboard boxes

Courtesy : <https://bit.ly/2XH5Yvs>



## FURTHER READING

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## NOTES

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