

PRACTICAL MANUAL
On
PRODUCTION OF WARM SEASON VEGETABLE CROPS

Course No. HVS-502; Credit Hrs. 3(2+1)

For

M.Sc. (Horticulture) Vegetable Science

I-year (1st Semester)



Dr. Arjun Lal Ola
Dr. Devesh Tiwari
Dr. Saurabh Singh

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Department of Vegetable Science
College of Horticulture and Forestry
Rani Lakshmi Bai Central Agricultural University
Jhansi-284003

Name of Student

Roll No.

Batch.....

Session.....

Semester.....

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Date:

Course Teacher

CONTENT

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| 1. | To study about the scientific raising of nursery and seed treatment of warm season vegetable crops. | |
| 2. | To study about the sowing and transplanting of warm season vegetable crops. | |
| 3. | Description of commercial varieties and hybrids of warm season vegetable crops. | |
| 4. | Demonstration on methods of irrigation in warm season vegetable crops. | |
| 5. | Demonstration on methods of fertilizers and micronutrients application in of warm season vegetable crops. | |
| 6. | To study about the Mulching practices in warm season vegetable crops. | |
| 7. | To study about the weed management in warm season vegetable crops. | |
| 8. | Use of plant growth substances in warm season vegetable crops. | |
| 9. | Study of nutritional and physiological disorders in warm season vegetable crops. | |
| 10 | Studies on hydroponics, aeroponics and other soilless culture. | |
| 11. | Identification of important pest and their control in warm season vegetable crops. | |
| 12. | Identification of important diseases and their control in warm season vegetable crops. | |
| 13. | To study about the maturity indices of warm season vegetables crops. | |
| 14 | To study about the Post-Harvest management (Grading, Packaging, Marketing). | |
| 15. | To Analysis of benefit to cost ratio in warm season vegetable crops. | |
| 16 | Preparation of cropping scheme for commercial farms. | |
| 17 | Visit to commercial farm, green house /polyhouses. | |

Experiment No. 1

Objective: To study about the scientific raising of nursery and seed treatment of warm season vegetable crops

Importance of scientific nursery-

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Materials Required:.....

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Factors affecting raising nursery

Location of the nursery:

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Soil

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Procedure of nursery bed preparation:

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Seed Treatment

Benefits of seed treatment:

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Name of Bio-agent use in seed treatment:

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Procedure of biological seed treatment

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Chemical seed treatments

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Irrigation.....
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Use of mulch
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Removal of mulch
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Use of shading nets
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Thinning
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Intercultural and weed control

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Plant protection

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Hardening of the plants in the nursery

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Draw lay out nursery bed



Experiment No. 2

Objective- To study about the sowing and transplanting of warm season vegetable crops

Introduction.....
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Materials Required:
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Selection of site for vegetable cultivation
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Characteristics of soil for vegetable cultivation
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Preparation of field/land
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Sowing

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Transplanting

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Reason for thinning

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Earthing up

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Experiment No. 3

Objective: Description of commercial varieties and hybrids of warm season vegetable crops

| Crop | Varieties | Specific feature of variety |
|----------------|-----------|-----------------------------|
| Tomato | | |
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| Brinjal | | |
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| Chilli | | |
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| Okra | | |

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| Cucumber | | |
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| Musk melon | | |
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| Water melon | | |
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| Round melon | | |
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| Bitter gourd | | |

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| Bottle gourd | | |
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| Snake gourd | | |
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| Ridge gourd | | |
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| Sponge gourd | | |
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| Pumpkin | | |
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| Pointed gourd | | |
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| Cow pea | | |
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| Cluster Bean | | |
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| | | |
| Dolichos Bean or Indian Bean | | |
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| | | |
| Sweet potato | | |
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| | | |
| Amaranthus | | |
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Experiment No. 4

Objectives- Demonstration on methods of irrigation in warm season vegetable crops

Introduction.....
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Materials Required:
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Methods of irrigation

A) Surface irrigation:
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1. Flood system:
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2. **Border method:**

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3. **Furrow method:**

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Basin method (ring and basin):

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B) Sub-surface/pipe irrigation:

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C) Localized irrigation:

1. Overhead or Sprinkler irrigation:

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Layout of Sprinkler Irrigation System

Experiment No. 5

Objective- Demonstration on methods of fertilizers and micronutrients application in of warm season vegetable crops

Introduction.....
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Materials Required:
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Methods of fertilizer application
A) Solid Fertilizers Application Methods

Broadcasting:
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Top Dressing:
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Side band:

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B) Liquid fertilizers application methods

Starter solution:

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Foliar application:

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Firtigation:

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Recommendation of primary nutrients (NPK) for different vegetable crops

| Crop | Recommended dose of primary nutrients (kg/ha) | | |
|--------------|---|-------------------------------|------------------|
| | N | P ₂ O ₅ | K ₂ O |
| Tomato | | | |
| Brinjal | | | |
| Chilli | | | |
| Okra | | | |
| Cowpea | | | |
| Sweet potato | | | |
| Broad bean | | | |
| Cucumber | | | |
| Musk melon | | | |
| Water melon | | | |
| Round melon | | | |
| Bitter gourd | | | |
| Pumpkin | | | |

Source of fertilizers supplying nutrients: Different fertilizer grade refers to the guaranteed minimum percentage of N, P₂ O₅, and K₂O contained in the fertilizer material. For example

Synthetic fertilizers and their nutrient composition

| Fertilizer | Composition (%) | | |
|--------------------------|-----------------|-------------------------------|------------------|
| | N | P ₂ O ₅ | K ₂ O |
| Urea | 46 | - | - |
| Calcium ammonium nitrate | 25 | | |
| Single super phosphate | - | 16 | - |
| Double super phosphate | - | 32 | - |
| Diammonium phosphate | 18 | 46 | - |
| Muriate of potash | - | - | 60 |

Calculation

If the recommended dose of nutrient and the percentage content of that nutrient in the fertilizer are known, the quantity of fertilizer required can be calculated by using following formula.

$$\text{Quantity of fertilizer required (kg)} = \frac{\text{(Recommended dose of nutrient application)}}{\text{(\% Nutrient content present in the fertilizer)}} \times 100$$

Example: Calculate the quantity of urea, single super phosphate (SSP) and muriate of potash (MOP) for one hectare of tomato as per application schedule viz., 1/3rd of N + full P and K at the time of planting and remaining N in two equal splits at one month interval. The recommended dose of nutrients is 120 kg N, 75 Kg P₂O₅ and 60 kg K₂O.

Solution:

Recommended dose of nutrients in tomato is 120 kg N, 75 Kg P₂O₅ and 60 kg K₂O.

Urea contains N = 46%

SSP contains P₂O₅ = 16%

MOP contains K₂O = 60%

Applying the formula

Quantity of urea required (kg/ha)

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Quantity of SSP required (kg/ha)

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Quantity of MOP required (kg/ha)

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Application schedule

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Experiment No. 6

Objective- To study about the mulching practices in warm season vegetable crops.

Introduction.....
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Materials Required:.....
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Merit of mulch.....
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Demerit of mulch:.....
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Type of mulch.
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Experiment No. 7

Objective- To study about the weed management in warm season vegetable crops.

Introduction.....

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Materials Required:

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Chemical weed control:

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Advantages of chemical weed control:

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Critical period for crop-weed competition in different vegetable crops

| S. No. | Crops | Critical period after sowing/planting (days) |
|--------|--------------|--|
| 1. | Tomato | |
| 2 | Brinjal | |
| 3 | Chilli | |
| 4 | Okra | |
| 5 | Cowpea | |
| 6 | Sweet potao | |
| 7 | Bread bean | |
| 8. | Cucumber | |
| 9 | Musk melon | |
| 10 | Water melon | |
| 11 | Round melon | |
| 12 | Bitter gourd | |
| 13 | Pumpkin | |

Precautions to be taken using herbicides:.....

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Problems associated in chemical weed control:
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Procedure for pre-emergence application of weedicide:
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**Calculation of dose of herbicide in terms of active in gradient
Quantity of commercial product of herbicide (kg per ha)**

$$= \frac{\text{(Recommended dose of herbicide)}}{\text{(a.i of herbicide formulation)}} \times 100$$

Solved example

If, you buy pendimethalin with 40% a.i. Its recommended dose of application in tomato is 1.0 kg/ha. Then, the quantity of commercial product required will be

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Calculation of quantity of water to be used

If, Spraying herbicide with hand operated Knapsack Spray pump, water required to cover one hectare area varies from 700-800 litres. So calculate the amount of water for spraying weedicide in 0.6 ha area?

**Quantity of water required per unit area (litre per unit area)
(water required for one ha × area to be sprayed)**

= $\frac{\quad}{10000}$

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Objective- Study of nutritional and physiological disorders in warm season vegetable crops

Introduction.....
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Materials Required:
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Nutritional and physiological disorders in warm season vegetable crops

A. Tomato

(i) Blossom end rot:
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Causes:.....
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Remedy:.....
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(ii) Catface:
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Causes:.....
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Remedy:.....
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(iii) Puffiness:

Causes:.....
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Remedy:.....
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(iv) Sun scald:

Causes:.....
.....

Remedy:.....
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(v) fruit cracking:

Causes:.....
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Remedy:.....
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B. Brinjal

(i) Poor fruit set:
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Causes:.....
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Remedy:.....
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C. Chilli

(i) Blossom – end rot:
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Causes:.....
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Remedy:.....
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(ii) Flower and fruit drop:
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Causes:.....

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Remedy:.....

D. Cucurbits:

Preponderance of staminate flowers and low fruit set:

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Causes:.....

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Remedy:.....

E. Okra

Poor seed germination:

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Causes:.....

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Remedy:.....

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Legumes:

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Leafy vegetable.....

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Okra.....

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Objective-Identification of important disease and their control in warm season vegetable crops

Introduction.....
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Materials Required

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Solaneseious:.....
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Cucurbits.....
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Legumes:

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Leafy vegetable.....

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Okra.....

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Objective- - To study about the maturity indices of warm season vegetables crops

Introduction.....
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Physiological maturity.....
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Horticultural maturity.....
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Maturity indices for cool season vegetable crops

1. Tomato

a) Immature green.....
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b) Mature green.....
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c) Turning (breaker stage)

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d) Pink stage.....

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e) Hard ripe stage:

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f) Over ripe stage.....

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2. Chilli

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3. Sweet Potato:

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4. Okra

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6. Moringa:

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7. Cucumber

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8. Bottle Gourd:

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9. Muskmelon:

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10. Watermelon:
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Objective- To study about the Post-Harvest management (Grading, Packaging, Marketing)

Introduction.....
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Materials Required:
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Precooling
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Advantages of precooling:
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Grading:
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Advantages of Grading:
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Packaging:

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Packaging materials

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Transportation

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Marketing

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Storage

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Experiment No. 15

Objective- To Analysis of benefit to cost ratio in warm season vegetable crops

Introduction.....

COST OF CULTIVATION OF CROPS PER HECTARE

A. Cost of variable Resources:

| S.No. | Name of Item | Quantity | Rate (Rs/Kg) | Total cost (Rs) |
|-------|---------------------------------|----------|--------------|-----------------|
| 1 | Seed cost | | | |
| 2 | Fertilizers cost: | | | |
| I | FYM | | | |
| II | Urea | | | |
| III | SSP | | | |
| IV | MOP | | | |
| 3 | Plant protection cost: | | | |
| A | Name of Pesticides/insecticides | | | |
| I | | | | |
| Ii | | | | |
| Iii | | | | |
| B | Fungicide: | | | |
| I | | | | |

| | | | | |
|--------------|--|--|--|--|
| Ii | | | | |
| Iii | | | | |
| 4. | Labour cost: | | | |
| A | Seed treatment | | | |
| b. | Land preparation | | | |
| (I) | Ploughing | | | |
| (II) | Planting | | | |
| (III) | Preparation of ridges and furrows or beds | | | |
| (c.) | Manures and Fertilizers application | | | |
| (d.) | Inter-culture operations | | | |
| (e.) | Irrigation | | | |
| (f.) | Plant protection | | | |
| (g.) | Harvesting | | | |
| (i.) | Packing/electricity charges | | | |
| (j.) | Nursery cost | | | |
| 5 | Transports charge | | | |
| | Total cost | | | |

| | | |
|----------------------------|----------------------------------|--|
| 6 | Miscellaneous (2% of total cost) | |
| 7. | Interest on working capital (5%) | |
| Total Variable cost | | |

B. Fixed Cost:

| S.No. | Item | Cost (Rs) |
|-------|---|-----------|
| 1 | Land Revenue (Rs.12/ha) | |
| 2 | Rental Value of Land | |
| 3 | Management Cost (5% of working capital) | |
| 4 | Interest on Fixed Capital (5%) | |
| | TOTAL FIXED COST | |

Cost of cultivation = Total Fixed Cost +Total Variable Cost.....

Average Yield

Sale Rate (Rs /kg)

Total Income/Cost of production/ha

Net Return = Total Income –total cost of cultivation

Benefit Cost Ratio = NET RETURN/ total cost of cultivation

