

**PRACTICAL MANUAL**  
**On**  
**PRODUCTION OF COOL SEASON VEGETABLE CROPS**

**Course No. HVS-501; Credit Hrs. 3(2+1)**

**For**

**M.Sc. (Horticulture) Vegetable Science**

**II-year (1<sup>st</sup> Semester)**



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**Session**.....

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## CONTENT

<b>S. No.</b>	<b>Topics</b>	<b>Page No.</b>
1.	To study about the scientific raising of nursery and seed treatment of cool season vegetable crops.	
2.	To study about the sowing and transplanting of cool season vegetable crops.	
3.	Description of commercial varieties and hybrids of cool season vegetable crops.	
4.	Demonstration on methods of irrigation in cool season vegetable crops.	
5.	Demonstration on methods of fertilizers and micronutrients application in of cool season vegetable crops.	
6.	To study about the mulching practices in cool season vegetable crops.	
7.	To study about the weed management in cool season vegetable crops.	
8.	Use of plant growth substances in cool season vegetable crops.	
9.	Study of nutritional and physiological disorders in cool season vegetable crops.	
10	Studies on hydroponics, aeroponics and other soilless culture.	
11.	Identification of important pest and their control in cool season vegetable crops.	
12.	Identification of important diseases and their control in cool season vegetable crops.	
13.	Study of maturity indices of cool season vegetable crops.	
14	To study about the Post-Harvest management (Grading, Packaging, Marketing).	
15.	Analysis of benefit cost ratio in cool 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 cool season vegetable crops**

**Introduction-**

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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**



**Procedure of seed sowing in nursery bed**

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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 or polysheets**

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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 cool 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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Onion		
Palak		
Spinach		
Lettuce		

## Experiment No. 4

**Objectives- Demonstration on methods of irrigation in cool 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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**Experiment No. 5**

**Objective- Demonstration on methods of fertilizers and micronutrients application in of cool 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:**

### Recommendation of primary nutrients (NPK) for different vegetable crops

Crop	Recommended dose of primary nutrients (kg/ha)		
	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
Cabbage			
Cauliflower			
Sprouting Broccoli			
Onion			
Garlic			
Pea			
Bread bean			
Spinach			

Source of fertilizers supplying nutrients: Different fertilizer grade refers to the guaranteed minimum percentage of N, P<sub>2</sub> O<sub>5</sub>, and K<sub>2</sub>O contained in the fertilizer material. For example

### Synthetic fertilizers and their nutrient composition

Fertilizer	Composition (%)		
	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> 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 P<sub>2</sub>O<sub>5</sub> and 60 kg K<sub>2</sub>O.

**Solution:**

Recommended dose of nutrients in tomato is 120 kg N, 75 Kg P<sub>2</sub>O<sub>5</sub> and 60 kg K<sub>2</sub>O.

Urea contains N = 46%

SSP contains P<sub>2</sub>O<sub>5</sub> = 16%

MOP contains K<sub>2</sub>O = 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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**Objective-** To study about the mulching practices in cool 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 cool season vegetable crops.**

**Introduction.....**

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**Materials Required:**

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**Chemical weed control: .....**

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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)**

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

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**Bulb crops**

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**Leafy Vegetable**

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**Bulb Crops:**

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**Leafy vegetable.....**

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

**Introduction**.....  
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**Materials Required**

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**Cole crops:**.....  
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**Root Crops**.....  
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**Bulb Crops:**

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**Leafy vegetable.....**

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**Objective- - To study about the maturity indices of cool 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**

**Cabbage**  
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**Cauliflower**  
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**Sprouting Broccoli**

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**Brussels Sprout.....**

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**Kale .....**

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**Carrot .....**

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**Radish.....**

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**Turnip:.....**

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**Beet root.....**

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**Onion : .....**

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**Garlic:.....**

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**Experiment No. 14**

**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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**Objective- Analysis of benefit cost ratio in cool season vegetable crops**

**Introduction**.....  
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**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				

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

6	Miscellaneous (2% of total cost)	
7.	Interest on working capital (5%)	
<b>Total Variable cost</b>		

**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%)	
	<b>TOTAL FIXED COST</b>	

**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**







