PRACTICAL MANUAL

TEMPERATE VEGETABLE CROPS

Course No. c; Credit Hrs. 2(1+1)

For B.Sc. (Horticulture) II-year (1st Semester)

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Syllabus: Temperate Vegetable Crops

Practical: Identification and description of varieties/hybrids; propagation methods, nursery management; preparation of field, sowing/transplanting; identification of physiological and nutritional disorders and their corrections; post-harvest handling; cost of cultivation and field visits to commercial farms.

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CONTENT

S. No.	Topics	Page No.
1.	Identification and description of temperate vegetable crops.	
2.	Description of varieties / hybrids temperate vegetable crops	
3.	To study about the propagation method of temperate vegetable crops	
4.	Preparation of nursery beds for raising seedlings of temperate vegetable crops.	
5.	To study about the seed treatment of temperate vegetable crops.	
6.	To study about seed sowing and nursery management for raising healthy seedlings of temperate vegetable crops	
7.	To study about the preparation of field for transplanting of seedlings and seed sowing	
8	To Calculation of fertilizer doses for various temperate vegetable crops as per recommendation for N, P and K	
9.	To study the physiological disorders of cole crop.	
10.	To study about the physiological disorders of root crop.	
11.	To study about the nutrient deficiency in temperate vegetable crops	
12	To study about the post harvest handling, marketing and storage of garden pea	
13	To study about the post harvest handling, marketing and storage of sprouting broccoli	
14	To study about the post harvest handling, marketing and storage of onion	
15	To calculate the cost of cultivation of cabbage per hectare	
16.	To calculate the cost of cultivation of garlic per hectare	
17.	To calculate the cost of cultivation of carrot per hectare	
18	To calculate the cost of cultivation of palak per hectare	
19	Commercial farm visit of temperate vegetable crops	

Experiment No. 1

Objective- Identification and description of temperate vegetable crops.

Common name	Botanical name	Family	Origin	Chromosome No.
Cabbage				
Cauliflower				
Knol-khol				
Sprouting broccoli				
Brussels' sprout				
Lettuce				
Palak				
Chinese cabbage				
Spinach				
Garlic				
Onion				
Leek				
Radish				
Carrot				
Turnip				
Beet root				
Peas				
Broad beans				
Rhubarb				
Asparagus				
Globe artichoke				
Vegetable kale				

Experiment No. 2

Objective- Description of varieties / hybrids temperate vegetable crops

Crop	Varieties	Specific feature of variety
Cabbage		
Cauliflower		
Knol-khol		
Sprouting broccoli		

Brussels' sprout		
Leek		
Radish		
Carrot		
Turnip		
Beet root		

Peas		
Garlic		
Onion		
Palak		

Spinach		
Lettuce		

Experiment No. 3

Objective- To study about the propagation method of temperate vegetable crops

Introduction-……

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Materials Required:……

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Method of propagation in temperate vegetable crops

1. **By Seed**……

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2. **By vegetative part**……

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Experiment No. 4

Objectives: Preparation of nursery beds for raising seedlings of temperate 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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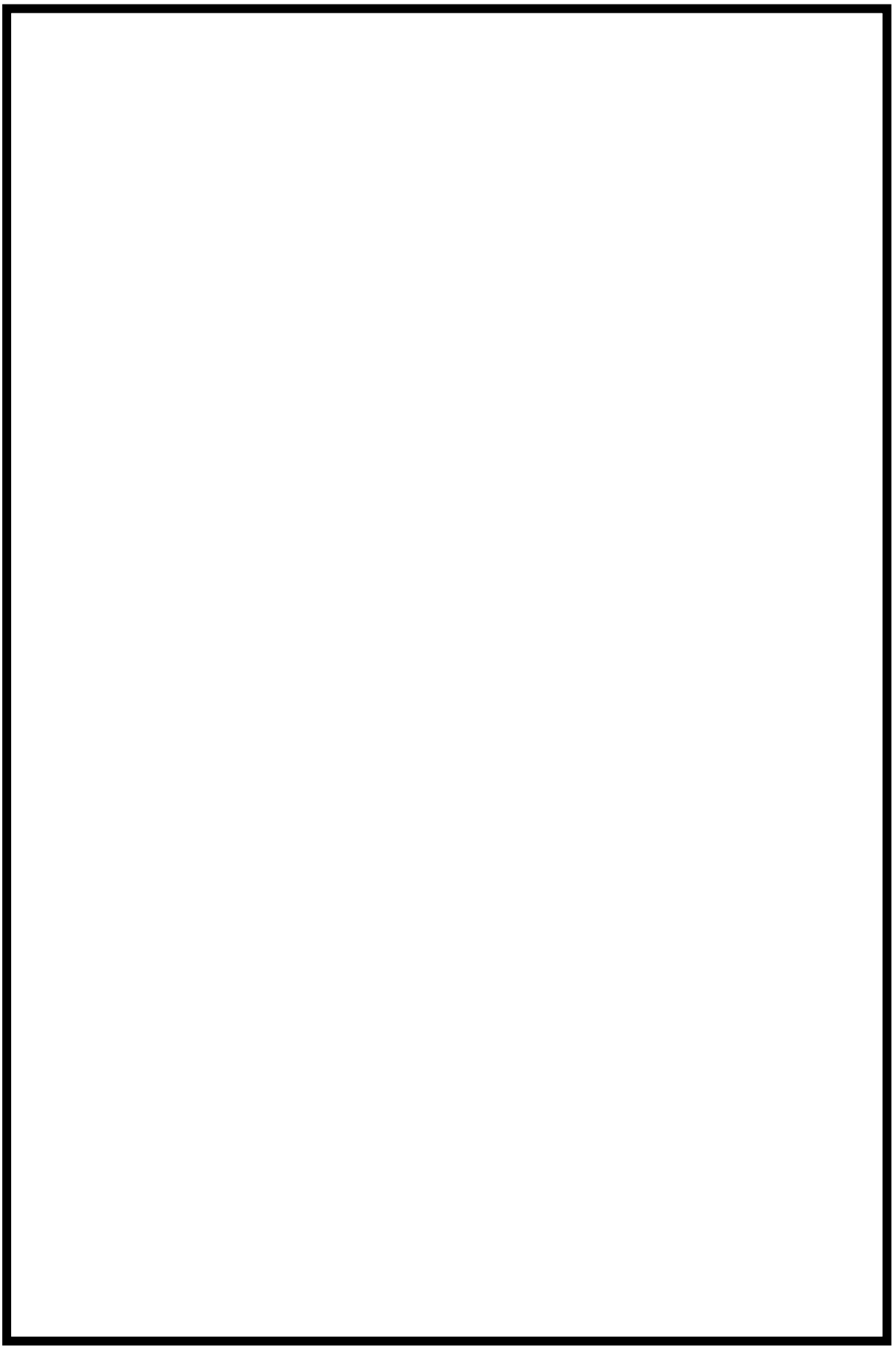
Draw lay out nursery bed



Experiment No. 5

Objective- To study about the seed treatment of temperate vegetable crops.

Introduction……

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Materials Required: .....

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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

Common fungicides used:…….....……

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Methods of using chemicals:

- **Dry/ Dust method:** .....

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Wet/ Slurry method:……

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Procedure of chemical seed treatment:

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Precautions to be taken while treating the seeds with chemicals: ……

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Experiment No. 6

Objective- To study about seed sowing and nursery management for raising healthy seedlings of temperate vegetable crops

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Materials Required:……

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Quantity of seed and nursery area required for raising seedlings for one-hectare area

Crop	Seed rate (g/ha)	Nursery area required (m^2)

Advantages of nursery raising in vegetable production: .....

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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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Experiment No. 7

Objective- To study about the preparation of field for transplanting of seedlings and seed sowing

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. 8

Objective- To Calculation of fertilizer doses for various temperate vegetable crops as per recommendation for N, P and K

Introduction……

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Recommendation of primary nutrients (NPK) for different vegetable crops

Crop	Recommended dose of primary nutrients (kg/ha)		
	N	**P_2O_5**	**K_2O**
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_2O_5, and K_2O contained in the fertilizer material. For example

Synthetic fertilizers and their nutrient composition

Fertilizer	**Composition (%)**		
	N	**P_2O_5**	**K_2O**
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_2O_5 and 60 kg K_2O.

Solution:

Recommended dose of nutrients in tomato is 120 kg N, 75 Kg P_2O_5 and 60 kg K_2O.

Urea contains N = 46%

SSP contains P_2O_5 = 16%

MOP contains K_2O = 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. 9

Objective- To study the physiological disorders of cole crop.

Experiment No. 10

Objective- To study about the physiological disorders of root crop.

Experiment No. 11

Objective- To study about the nutrient deficiency in temperate vegetable crops

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Materials Required: .....

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Nitrogen: .....

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Phosphorus: .....

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Potassium: .....

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Chloride: .....

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Magnesium: .....

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Molybdenum: .....

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Sulfur: .....

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Boron: .....

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Iron: .....

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Zinc: .....

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Calcium: .....

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Copper: .....

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Manganese: .....

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Nickel: .....

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Experiment No. 12

Objective- To study about the post harvest handling, marketing and storage of garden pea

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. 13

Objective- To study about the post harvest handling, marketing and storage of sprouting broccoli

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. 14

Objective- To study about the post harvest handling, marketing and storage of onion

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 calculate the cost of cultivation of cabbage per hectare

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				
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			
H	Packing/electricity charges			
I	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

Experiment No. 16

Objective- To calculate the cost of cultivation of garlic per hectare

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				
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			
H	Packing/electricity charges			
I	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

Experiment No. 17

Objective- To calculate the cost of cultivation of carrot per hectare

Introduction……..……..

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<u>COST OF CULTIVATION</u> 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			
H	Packing/electricity charges			
I	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

Experiment No. 18

Objective- To calculate the cost of cultivation of palak per hectare

Introduction……

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<u>COST OF CULTIVATION</u> 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			
H	Packing/electricity charges			
I	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

Experiment No. 19

Objective- Commercial farm visit of temperate vegetable crops