PRACTICAL MANUAL

PRODUCTION TECHNOLOGY FOR VEGETABLE AND SPICES

Course No. APH-276; Credit Hrs. 2(1+1)

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

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Syllabus: Production techniques for vegetable and spices

Practical: Identification of vegetables & spice crops and their seeds. Nursery raising. Direct seed sowing and transplanting. Study of morphological characters of different vegetables & spices. Fertilizers applications. Harvesting & preparation for market. Economics of vegetables and spices cultivation.

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CONTENTS

Experiment No. 1

Objective- Identification of vegetable and spices crops.

Common name	Botanical name	Family	Origin	Ch.no.
Tomato				
Brinjal				
Chilli				
Capsicum				
Okra				
Cucumber				
Musk melon				
Water melon				
Round melon				
Bitter gourd				
Bottle gourd				
Snake gourd				
Ridge gourd				
Sponge gourd				
Pumpkin				
Pointed gourd				
Pea				
Franch bean				
Cabbage				
Cauliflower				
Knol-khol				
Onion				
Garlic				
Carrot				
Radish				

Beetroot				
Potato				
Amaranth				
Palak				
Drumstick				
Glob Artichoke				
Asparagus				
Coriander				
Fennel				
Fenugreek				
Dill				
Cumin				
Ginger				
Turmeric				
Nigella				
Curry leaf				

Experiment No. 2

Objective- Identification of vegetable and spices seeds

Common name	Shape of seeds	Colour of seeds	Size of seeds	Surface of seeds	Other
Tomato					
Brinjal					
Chilli					
Capsicum					
Okra					
Cucumber					
Musk melon					
Water melon					
Round melon					
Bitter gourd					
Bottle gourd					
Snake gourd					
Ridge gourd					
Sponge gourd					
Pumpkin					
Pointed gourd					
Pea					
Franch bean					
Cabbage					
Cauliflower					
Knol-khol					
Onion					
Garlic					
Carrot					
Radish					

Beetroot					
Potato					
Amaranth					
Palak					
Drumstick					
Globe Artichoke					
Asparagus					
Coriander					
Fennel					
Fenugreek					
Dill					
Cumin					
Ginger					
Turmeric					
Nigella					
Curry leaf					

Experiment No. 3

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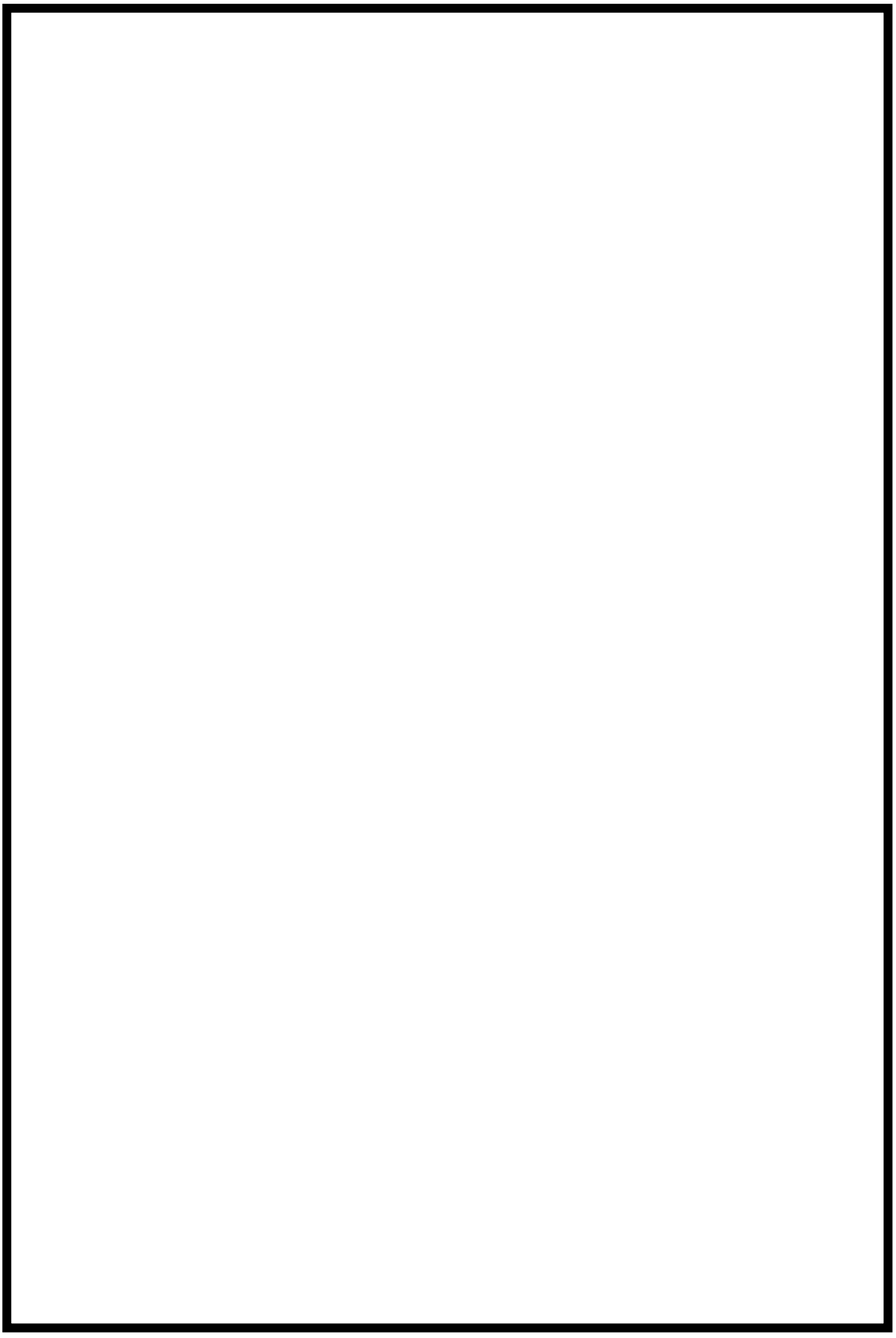
Draw lay out nursery bed



Experiment No. 4

Objective- To study about the seed treatment of vegetable and spices 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. 5

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

Introduction……

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Materials Required:……

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Season of sowing: ……

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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. 6

Objective- To study about the preparation of field for transplanting of seedlings or direct 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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Thinning: ……..

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Earthing up: ……

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Experiment No. 7

Objective- To study about the morphological characters of tomato

Materials Required: ……

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Introduction: ……..

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Root: ……

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Steam: ……..

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Leaves: ……

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Floral Biology and floral structure

Inflorescence: ……

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Flower: ……

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Calyx: ……

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Corolla: ……

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Androecium: ……

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Gynoecium: ……

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Floral formula……

Draw flower structure and floral diagram:

Experiment No. 8

Objective- To study about the morphological characters of cucumber

Materials Required: ……

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Introduction: ……..

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Root: ……..

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Steam: ……..

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Leaves: ……

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Floral Biology and floral structure

Inflorescence: ……..…

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Flower: ……..……

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Calyx: ……..……

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Corolla: ……

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Androecium: ……

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Gynoecium: ……

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Floral formula……

Draw flower structure and floral diagram:

Experiment No. 9

Objective- To study about the morphological characters of cabbage

Materials Required: ……

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Introduction: ……..

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Root: ……..

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Steam: ……..

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Leaves: ……

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Floral Biology and floral structure

Inflorescence: ……

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Flower: ……

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Calyx: ……

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Corolla: ……

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Androecium: ……

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Gynoecium: ……

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Floral formula……

Draw flower structure and floral diagram:

Experiment No. 10

Objective- To study about the morphological characters of onion

Materials Required: ……

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Introduction: ……..

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Root: ……..

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Steam: ……..

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Leaves: ……

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Floral Biology and floral structure

Inflorescence: ……..…

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Flower: ……..……

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Calyx: ……..……

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Corolla: ……

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Androecium: ……

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Gynoecium: ……

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Floral formula……

Draw flower structure and floral diagram:

Experiment No. 11

Objective- To study about the morphological characters of radish

Materials Required: ……

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Introduction: ……..

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Root: ……..

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Steam: ……..

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Leaves: ……

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Floral Biology and floral structure

Inflorescence: ……..…

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Flower: ……..……

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Calyx: ……..……

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Corolla: ……

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Androecium: ……

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Gynoecium: ……

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Floral formula……

Draw flower structure and floral diagram:

Experiment No. 12

Objective- To study about the morphological characters of Palak

Materials Required: ……

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Introduction: ……..

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Root: ……

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Steam: ……..

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Leaves: ……

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Floral Biology and floral structure

Inflorescence: ……..…

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Flower: ……..……

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Calyx: ……..……

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Corolla: ……

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Androecium: …….

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Gynoecium: ……

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Floral formula……

Draw flower structure and floral diagram:

Experiment No. 13

Objective- To study about the morphological characters of coriander

Materials Required: ……

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Introduction: ……..

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Root: ……..

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Steam: ……..

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Leaves: ……

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Floral Biology and floral structure

Inflorescence: ……..…

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Flower: ……..……

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Calyx: ……..……

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Corolla: ……

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Androecium: ……

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Gynoecium: ……

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Floral formula……

Draw flower structure and floral diagram:

Experiment No. 14

Objective- To study about the morphological characters of fenugreek

Materials Required: ……

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Introduction: ……..

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Root: ……..

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Steam: ……..

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Leaves: ……

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Floral Biology and floral structure

Inflorescence: ……..…

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Flower: ……..……

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Calyx: ……..……

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Corolla: ……

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Androecium: ……

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Gynoecium: ……

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Floral formula……

Draw flower structure and floral diagram:

Experiment No. 15

Objective- - To study about the fertilizer application in vegetable and spices 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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Fertigation: ……

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Experiment No. 16

Objective- To study about the harvesting and post-harvest handling of vegetable and spices crops.

Harvesting: ..……...……...

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Tomato: .……

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Brinjal: ……..…

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CHILLI & CAPSICUM

Green fruits: ……

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Red fruits*:* ……

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Cucurbits (cucumber, bottle gourd, bitter gourd, snake gourd, ridge gourd and sponge gourd)

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Cucumbers ……

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Leafy vegetables: ..……

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Beans ……..……

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Cabbage: ……

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Cauliflower: ……

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Onion: ……

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Radish: ……

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Potato: ……

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Coriander: ……

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Fenugreek: ……

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Cumin: ……

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Precautions during harvesting: ……...

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Precooling: ……..

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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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Experiment No. 17

Objective- To calculate the cost of cultivation of tomato

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. 18

Objective- To calculate the cost of cultivation of cabbage

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. 19

Objective- To calculate the cost of cultivation of fenugreek

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. 20

Objective- To calculate the cost of cultivation of onion

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