

BREEDING OF FRUIT CROPS

HFS-504, 3(2+1)

Practical Manual



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Syllabus: Breeding of Fruit Crops, HFS-504, 3(2+1)

Practical: Exercises on bearing habit, floral biology. Pollen viability and fertility studies. Hands on practices in hybridization. Raising and handling of hybrid progenies. Evaluation of biometrical traits and quality traits. Screening for resistance against abiotic stresses. Developing breeding programme for specific traits. Visit to research stations working on fruit breeding.

Name of Students:

Roll No..... Batch.....

Session Semester.....

Course Name

Course No: Credit:

Certificate

This is to certify that Shri./Km.

ID No: has completed the practical of
courses courses No

..... as per the syllabus of M. Sc (Horticulture) Fruit

Science semester in year

.....in the respective lab/field of college.

Date:

Course Teacher

CONTENTS

S. No	Name of Exercise	Signature
1.	To identify and uses of Plant Breeders Kits	
2.	To learn the method of colchicines treatment in order to induce polyploidy in fruit crops.	
3.	To learn the method of application of EMS in seeds for mutation	
4.	To study about floral biology of Mango	
5.	To study about floral biology and different cultivars of Banana	
6.	To study about floral biology of Sapota	
7.	To learn about pollen viability test in different fruit crops	
8.	To know the procedure of emasculation and pollination of flower for making artificial crosses.	
9.	To study and practice of crossing technique in major fruit crops	
10.	To study about floral biology of different species of Citrus	
11.	To study about floral biology and hand pollination of Custard Apple	
12.	To study about different sex forms of papaya	
13.	To study the breeding approaches for drought resistance	
14.	To study the important fruit varieties developed through conventional breeding methods	
15.	To study the estimation of variability parameters	
16.	To visit to biotechnology lab and <i>in vitro</i> study of breeding technique	

Exercise No: 1

Objective: To identify and uses of Plant Breeders Kits

A breeder wants the following tools for controlled breeding regarding work and for field observation purpose.

S. No	Name of the kits	Uses
1.	Fine pointed forceps:	
2.	Small/ curved scissor:	
3.	Long straight scissor:	
4.	Needle:	
5.	Sharp pointer:	
6.	Magnifying lens:	

7.	U-pins (u- clips):
8.	Paint brush:
9.	Pencil:
10.	Washing bottle or Spirit bottle:
11.	Wire ring and smooth thread:
12.	Small white tag:
13.	Soda straw tubes:
14.	Waxy threads:

15.	Luggage labels (white or yellow):
16.	Aluminum label with wire:
17.	Muslin cloth bag (large size):
18.	Yellow sample bag:
19.	Paper Bag:
20.	Kite paper bag (white/red):
21.	Field Notebook:

Assignment: List the various apparatus of breeder's kit and write its uses.

(Signature of Course Instructor)

Exercise No: 2

Objective: To learn the method of colchicines treatment in order to induce polyploidy in fruit crops.

Plants having more than two sets of chromosomes are referred as polyploids. Autopolyploids can be induced by chemical mutagen like acenaphthene, colchicines, caumarin etc. The colchicines is most widely used for chromosome doubling. Colchicines inhibit the formation of spindles fibre during metaphase. As a result, karyokinensis does not occur and the chromosome number of treated cells gets doubled.

Material required:

Procedure:

Seed treatment:

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Shoot apex:

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Observations: 10 seedlings should be treated and to be observe

	Morphological characters treated plants	Morphological characters untreated plants
Seed treatment		
Seedling treatment		
Short apex treatment		

The observation for polyploidy to be recorded throughout the semester

(Signature of Course Instructor)

Exercise No: 3

Objective: To learn the method of application of EMS in seeds for mutation

Among the chemical mutagens, the Ethylmethane sulphonate (EMS) is frequently used for induction of mutation.

Material required:

Procedure:

Observation: 10 treated and 10 untreated seedlings to be transplanted for recording observation

1. Percentage of germination

Untreated.....

Treated.....

2. Morphological characters (after 90 days)

		Seedling number									
		1	2	3	4	5	6	7	8	9	10
Height	Untreated										
	Treated										
Girth	Untreated										
	Treated										
Leaf area	Untreated										
	Treated										
Internodal length	Untreated										
	Treated										

3. Floral character

		Seedling number									
		1	2	3	4	5	6	7	8	9	10
Height of 1 st flowering	Untreated										
	Treated										
Sex of flower	Untreated										
	Treated										
Sessile on with pedicel	Untreated										
	Treated										

(Signature of Course Instructor)

Draw well-labelled diagram



(Signature of Course Instructor)

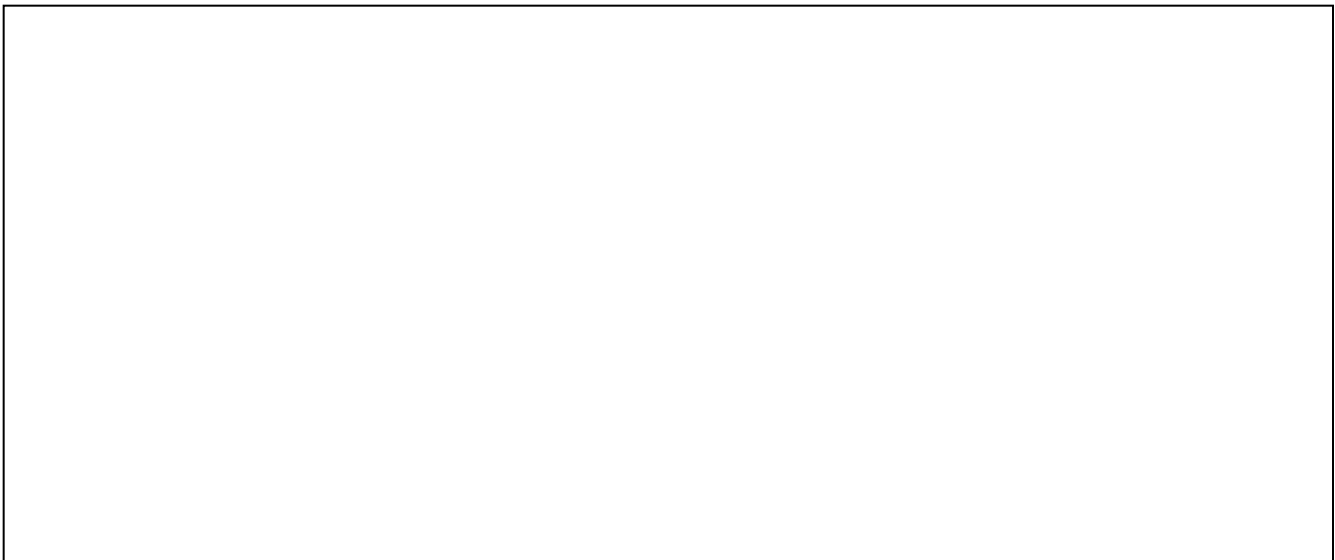
Qualitative Observations:

S No	Qualitative characters	Description
1.	Corolla colour	
2.	Calyx colour	
3.	Anther colour	
4.	Stigma colour	
5.	Position of ovary	

Qualitative observations:

S No	Qualitative characters	Average
1.	Number of petals	
2.	Number of stamens	
3.	Number of sepals	
4.	Length of pistils	
5.	Length of stamen	

Draw well labeled diagram of Sapota flower and its parts



(Signature of Course Instructor)

Exercise No: 9

Objective: To study and practice of crossing technique in major fruit crops

Hybridization refers to mating or crossing of two plants or lines of diverse genotypes to obtain a viable hybrid progeny. The seed as well as the progeny resulting from hybridization are known as 'hybrid' or F₁.

Crossing techniques:

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Material required:

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Hybridization Technique:

Selection of parents:

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Evaluation of parents:

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Emasculation:

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Bagging:

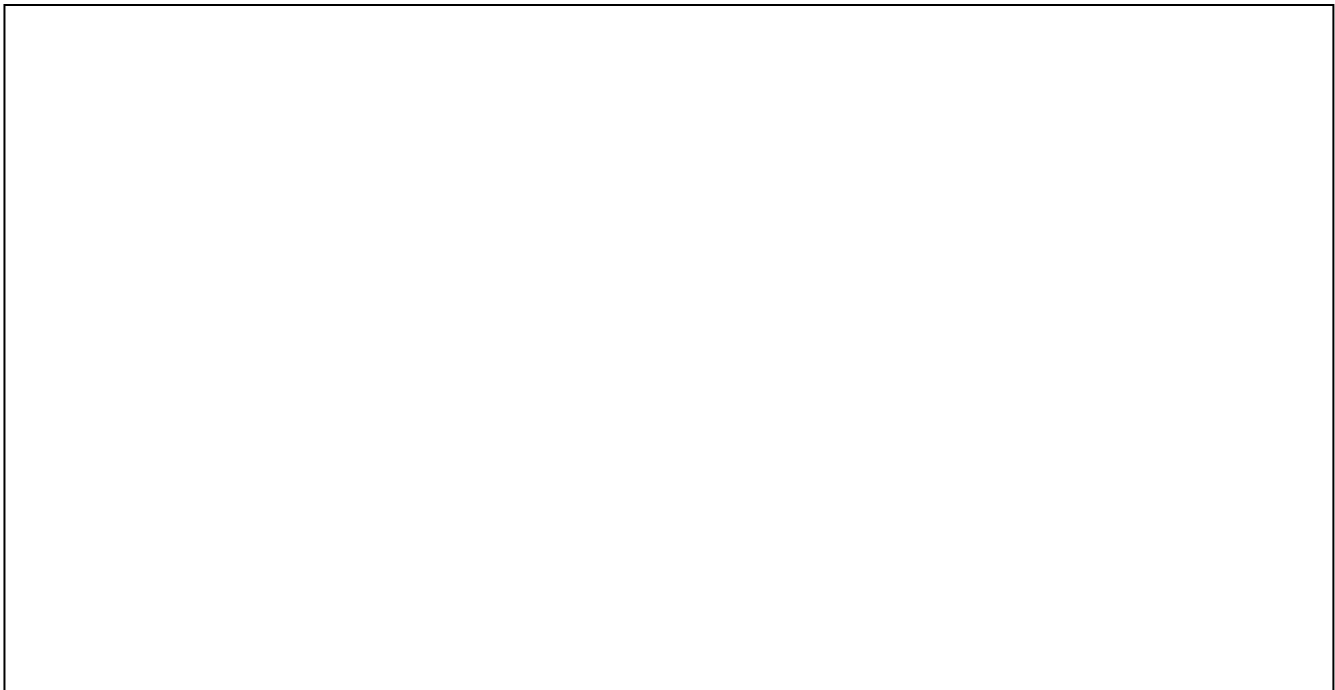
Qualitative observation

S. No	Qualitative characters	Description
1.	Petal (present/absent)	
2.	Calyx colour	
3.	Anther colour	
4.	Stigma colour	
5.	Position of ovary	

Qualitative observation

S. No	Qualitative characters	Average
1.	Number of stamens	
2.	Number of sepals	
3.	Length of pistils	
4.	Length of stamen	

Draw well labeled diagram of citrus flower and its parts



(Signature of Course Instructor)

Papaya			
Guava			
Pomegranate			

Apple			
Citrus			

(Signature of Course Instructor)

Exercise No: 16

Objective: To visit to biotechnology lab and *in vitro* study of breeding technique

(Signature of Course instructor)