Practical manual

Plant Propagation and Nursery Management

Course No. HFS -103 Credit Hrs. 2(1+1)

For B.Sc. (Hons.) Horticulture II Semester students

Dr. Anjana Kholia Dr. Ranjit Pal



2019

College of Horticulture & Forestry
Rani Lakshmi Bai Central Agricultural University, Jhansi – 284003

Syllabus:

Date:

Media for propagation of plants in nursery beds, potting and repotting. Preparation of nursery beds and sowing of seeds. Raising of rootstock. Seed treatments for breaking dormancy and inducing vigorous seedling growth. Preparation of plant material for potting. Hardening plants in the nursery. Practicing different types of cuttings, layering, graftings and buddings including opacity and grafting, top grafting and bridge grafting etc. Use of mist chamber in propagation and hardening of plants. Preparation of plant growth regulators for seed germination and vegetative propagation. Visit to a tissue culture laboratory. Digging, labelling and packing of nursery fruit plants. Maintenance of nursery records. Use of different types of nursery tools and implements for general nursery and virus tested plant material in the nursery. Cost of establishment of a mist chamber, greenhouse, glasshouse, polyhouse and their maintenance. Nutrient and plant protection applications during nursery.

Name of Student

Dall Na
Roll No.
Batch
Session
Semester
Course Name :
Course No. :
Credit
Published: 2019
No. of copies:
Price: Rs.
©RLBCAU, Jhansi
CERTIFICATE
This is to certify that Shri./Km
completed the practical of coursecourse No
as per the syllabus of B.Sc. (Hons.) Agriculture/ Horticulture/ Forestry semester in the
yearin the respective lab/field of College.

Course Teacher

INDEX

1. Identification of tools and equipment used for plant propagation and nursery management 2. To study about different media for propagation of plants 3. To study about preparation of nursery bed 4. To study about of scarification and stratification to overcome the seed dormancy 5. To study about propagation through cutting 6. To study about propagation through simple layering 7. To study about propagation through serpentine layering 8. To study about propagation through air layering 9. To study about propagation through mound/ stool layering 10. To study about propagation through grafting 11. To study about propagation through budding 12. To study about lining out, digging and packing of plants from nursery 13. To study about calculations and preparation of PGRs solutions 14. Visit to tissue culture laboratory 15. To study about use of mist chamber for propagation and hardening of plants 16. Layout of commercial fruit nursery	Page no.
3. To study about preparation of nursery bed 4. To study about of scarification and stratification to overcome the seed dormancy 5. To study about propagation through cutting 6. To study about propagation through simple layering 7. To study about propagation through serpentine layering 8. To study about propagation through air layering 9. To study about propagation through mound/ stool layering 10. To study about propagation through grafting 11. To study about propagation through budding 12. To study about lining out, digging and packing of plants from nursery 13. To study about calculations and preparation of PGRs solutions 14. Visit to tissue culture laboratory 15. To study about use of mist chamber for propagation and hardening of plants	
 To study about of scarification and stratification to overcome the seed dormancy To study about propagation through cutting To study about propagation through simple layering To study about propagation through serpentine layering To study about propagation through air layering To study about propagation through mound/ stool layering To study about propagation through grafting To study about propagation through budding To study about propagation through budding To study about lining out, digging and packing of plants from nursery To study about calculations and preparation of PGRs solutions Visit to tissue culture laboratory To study about use of mist chamber for propagation and hardening of plants 	
 To study about propagation through cutting To study about propagation through simple layering To study about propagation through serpentine layering To study about propagation through air layering To study about propagation through mound/ stool layering To study about propagation through grafting To study about propagation through budding To study about lining out, digging and packing of plants from nursery To study about calculations and preparation of PGRs solutions Visit to tissue culture laboratory To study about use of mist chamber for propagation and hardening of plants 	
6. To study about propagation through simple layering 7. To study about propagation through serpentine layering 8. To study about propagation through air layering 9. To study about propagation through mound/ stool layering 10. To study about propagation through grafting 11. To study about propagation through budding 12. To study about lining out, digging and packing of plants from nursery 13. To study about calculations and preparation of PGRs solutions 14. Visit to tissue culture laboratory 15. To study about use of mist chamber for propagation and hardening of plants	
7. To study about propagation through serpentine layering 8. To study about propagation through air layering 9. To study about propagation through mound/ stool layering 10. To study about propagation through grafting 11. To study about propagation through budding 12. To study about lining out, digging and packing of plants from nursery 13. To study about calculations and preparation of PGRs solutions 14. Visit to tissue culture laboratory 15. To study about use of mist chamber for propagation and hardening of plants	
8. To study about propagation through air layering 9. To study about propagation through mound/ stool layering 10. To study about propagation through grafting 11. To study about propagation through budding 12. To study about lining out, digging and packing of plants from nursery 13. To study about calculations and preparation of PGRs solutions 14. Visit to tissue culture laboratory 15. To study about use of mist chamber for propagation and hardening of plants	
9. To study about propagation through mound/ stool layering 10. To study about propagation through grafting 11. To study about propagation through budding 12. To study about lining out, digging and packing of plants from nursery 13. To study about calculations and preparation of PGRs solutions 14. Visit to tissue culture laboratory 15. To study about use of mist chamber for propagation and hardening of plants	
10. To study about propagation through grafting 11. To study about propagation through budding 12. To study about lining out, digging and packing of plants from nursery 13. To study about calculations and preparation of PGRs solutions 14. Visit to tissue culture laboratory 15. To study about use of mist chamber for propagation and hardening of plants	
11. To study about propagation through budding 12. To study about lining out, digging and packing of plants from nursery 13. To study about calculations and preparation of PGRs solutions 14. Visit to tissue culture laboratory 15. To study about use of mist chamber for propagation and hardening of plants	
12. To study about lining out, digging and packing of plants from nursery 13. To study about calculations and preparation of PGRs solutions 14. Visit to tissue culture laboratory 15. To study about use of mist chamber for propagation and hardening of plants	
13. To study about calculations and preparation of PGRs solutions 14. Visit to tissue culture laboratory 15. To study about use of mist chamber for propagation and hardening of plants	
14. Visit to tissue culture laboratory 15. To study about use of mist chamber for propagation and hardening of plants	
To study about use of mist chamber for propagation and hardening of plants	
Leveut of commercial fruit nursery	
Levent of commercial fruit purpors	
16. Layout or commercial fruit nursery	
17. Maintenance of nursery records	
18. Visit to commercial Nursery	
APPENDIX	

Objective: Identification of tools and equipment used for plant propagation and nursery management

1. Observation to be recorded:

S. No.	Tool / Equipment	Uses	Diagram
	Name		

Objective: To study about media for propagation of plants

Material required: Soil, sand, FYM, coco peat, vermiculite, perlite, media preparing tools, pots Media used for propagation of horticultural plants mainly consists of organic and inorganic components. Procedure: 1) Soil mixes: 2) Soil less media:

	cautions:	
Wr	ite in brief:	
a)	Vermiculite:	
••••		
b)	Perlite:	
b)	Perlite:	
b)	Perlite:	
	Perlite: Peat:	
 c)		
 c)	Peat:	
 c)	Peat: Cocopeat:	

Objective: To study about preparation of nursery bed

Material required: Rope, Spade, hand leveller
Procedure:

Praw well labelled diagram of nursery bed									

Objective: To study about scarification and stratification. How to overcome the seed dormancy?											
Mate	Material required: Seed, hammer, acid, glassware, medium and refrigerator.										
Step	wise procedure followed for Sca	arification:									
1. Ok	oservations:										
S.	Type of Scarification	No. of seeds sown	No. of seed	Percentage of							
No.		for germination	germinated	germination							
1.	Mechanical scarification										
2.	Chemical scarification										
3	No scarification										

Ste	pwise procedure	followed for S	stratification:			
		•••••				
••••						
						•••••
						•••••
						•••••
2. (Observations:					
				_		
S.				No. of seed sown		
No.	for stratification	sprouted	sproutea seeas	in bed germinated	germinated	germination

Objective: To study about different type of cuttings for propagation Material required: Secateurs, knife, cutting and polybags Procedure: Observation to be recorded Percentage of rooted Average root S. Types of cutting No. of cutting No. of cutting planted/made rooted cutting length No. Hard wood Semi hard wood Soft wood

Herbaceous

Objective: To study about simple layering method

Material required: Knife, branches / shoots of suitable plants for practicing methods of vegetative propagation. Draw the well labelled diagram of simple layering

Objective: To study about serpentine layering method

Material	required:	 Knife, branches / shoots of suitable plants for practicing methods of vegetating propagation. 	ve
Procedu	ıre:		
			•••
			•••
			•••
			•••
			•••
			•••
***************************************			•••
			•••
			•••
			•••
Draw the	e well labe	elled diagram of serpentine layering	_

Objective: To study about air layering/ gootee/ marcottage.

Material	required:	Knife,	plastic	strips,	sphagnum	moss,	branches	1	shoots	of	suitable	plants	for
		practio	ing met	hods o	f vegetative	propag	ation.						

Procedure:
Draw the well labelled diagram of air layering

Objective: To study about propagation through mound / stool layering

Material required: Knife, plastic strips, sphagnum moss, branches / shoots of suitable plants for practicing methods of vegetative propagation.

Procedure:
Draw the well labelled diagram of mound/ stool layering

Practical No. 10 Objective: To study about propagation through grafting Material required: Secateur, grafting knife, plastic strip, scion and stock.

Practical No. 11 Objective: To study about propagation through budding Material required: Secateur, budding knife, plastic strip, scion and stock.

w the well labelled diagram of different types of budding					

Obi	ective:	То	study	about	linina	out.	diaging	and	packing	of	plants	from	nurserv
		. •				,		••	P 0. 0g	•			

Material required:	Nursery	stock,	Khurpi	(Hand	hoe),	straw	or b	burlap,	jute	thread,	basket	or	boxes	s for
	packing,	sphag	num m	OSS.										

Procedure:	
	••
	••
	• •
	••
	••
	•••

raw the well labe	elled diagram			

Objective: To study about preparation and calculation related to PGRs. Material required: PGRs, glassware, distilled water, solvents and weighing balance and pH meter. Calculation:

Elaborate following terms	
PGRs:	
Stock solution:	
Stock Solution.	
Working solution:	

Objective: Visit to tissue culture laboratory

Material required: Tissue culture laboratory

1.	Write details of various tissue culture rooms/chambers
	Media preparation room:
	Inoculation room:
	Crowth Chambar
	Growth Chamber:
	Hardening room/glass house:
2.	Write in brief about the important uses of the following in tissue culture.
	Refrigerator:
	Analytical balance:

Autoclave:	••••
pH meter:	
Laminar airflow:	
Aggri	
Agar:	
Agar:	
Agar: PGRs:	
PGRs: Surface sterilants:	
PGRs:	
PGRs: Surface sterilants:	

.....

	ecautions to be followed while working in a tissue culture lab
•	
	P
	Explain the following terms: Explants
	Callus
	Subculture
	Subculture
	Transfer
	Plantlets

In-vitro	
III-VILIO	
Ex-vitro	
Hardening	

Practical No. 15

Objective: To study about use of mist chamber for propagation and hardening of plants

Materials required: Mist chamber
Mist propagation units:
Control mechanisms of mist:
Timer:
Electronic leaf:
Thermostat:

	• • •
Screen balance:	
	•••
	• • •
Photoelectric cell:	
	• • • •
Hardening of plants in mist chamber:	
Transcrining of plants in finist chamber.	
	• • • •
	• • • • •
	••••
Precautions:	
1 reductions.	• • • •
	• • • •
	••••

Objective: Layout of commercial fruit nursery Draw layout of commercial fruit nursery

Elaborate the following terms:
Mother block:
Potting house:
Seedling block:
Seediling block.
Stool bed:
Seed store:
Packing house:
Wind breaks:

.....

Nursery Store:	
Nursery Bed:	
Pump House:	

Objective: Maintenance of nursery records.

Materials required: Registers, chronological operation record, nursery map.

Procedure:

- 1. Some records are essential if nurseryman is to plan his nursery for remunerative returns and establish as a reputed enterprise.
- 2. A nursery planner should know how long it takes to lift saplings or how much seed is required, or how much cuttings he can accommodate in a glasshouse or how much scion wood is required for grafting a particular plot of nursery.
- 3. There must be specific register for specific selected activities to keep day to day or pedigree or operation records in nursery.
- 4. These records are required by law to satisfy inspecting authorities, tax calculation, detect or discourage theft in case of big nurseries. The important aspects for which maintenance of record is necessary are as under:

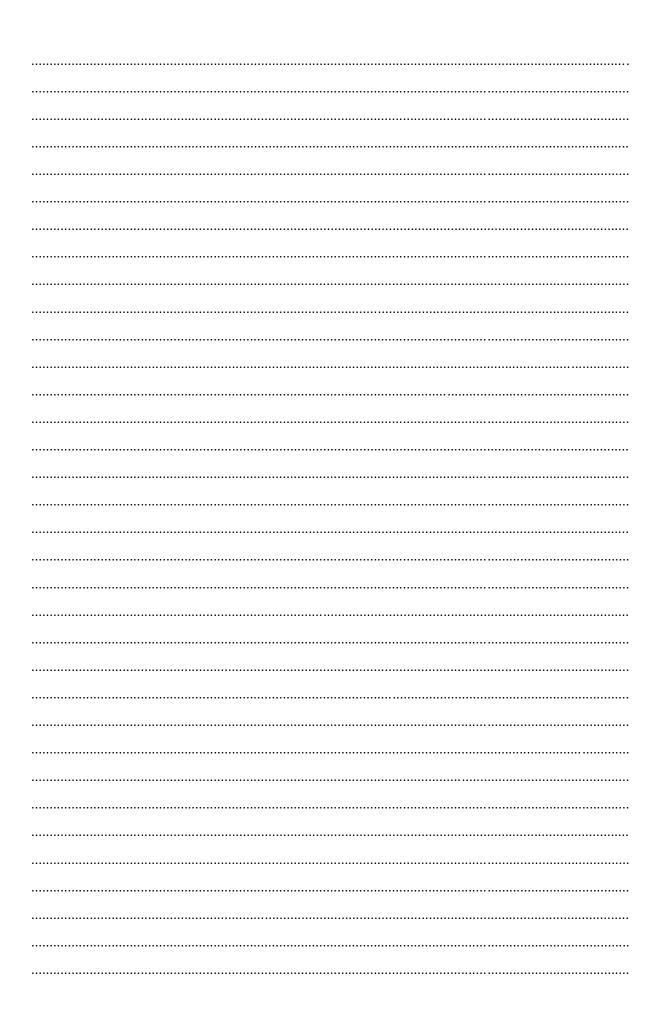
Progeny orchard record:
Nursery layout record:
Cultural operations record:

Disposal register:	
	•••
	•••
	•••
	•••
Advisory/visitor register:	
•	
Precautions:	••
	•••

Objective: Visit to commercial Nursery

Material	required:	Commercial	nursery
material	required.	Committee	Tiul oci y

Report	of	the v	isit:
			••••
			••••



APPENDIX

Solvents for dissolving plant growth regulators				
S. No.	Group	Name	Solvent (s)	
1.	Auxins	IAA, 2,4-D	Water	
		IBA, NAA	EtOH, 1N NaoH	
2.	Gibberellic acid	GA ₃	EtOH	
3.	Cytokinins	6-Benzylaminopurine (BA), Kinetin, Zeatin	1N, NaOH	
4.	Ethylene	Ethrel	Water	
5.	Abscisic acid	ABA	1N NaOH	