



DEPARTMENT OF FRUIT SCIENCE
DR. Y.S. PARMAR UNIVERSITY OF HORTICULTURE AND FORESTRY,
NAUNI, SOLAN 173230

FINAL REPORT FOR THE VOCATION CERTIFICATE COURSE ON
NURSERY PRODUCTION OF TEMPERATE FRUITS

1.	Name of the Vocational Course	:	Vocational Certificate Course on “Nursery Production of Temperate Fruits” under IDP (NAHEP).
2.	Team Members and Head of the Department	:	Dr. DP Sharma, Professor and Head, Dept. of Fruit Science Dr. NC Sharma, Activity Incharge Dr. Pramod Verma, Co-activity Incharge
3.	Date of commencement	:	12-11-2021
4.	Date of completion	:	06-04-2022
5.	Objectives:		<ul style="list-style-type: none">➤ To develop skilled professionals and entrepreneur in nursery production of temperate fruits➤ to impart technical information in the field of temperate fruits nursery production➤ to enhance the skills and knowledge of trainees in raising techniques for mass multiplication of quality nursery plants➤ to impart technical information for the establishment of hi-tech temperate fruit nurseries.
6.	Topics covered (Theory + Practical):		
	Theory: <ol style="list-style-type: none">1. Establishing a nursery-what to consider.2. Nursery registration, certification and recognition.3. Plant propagation and types.4. Nursery beds and propagation media.5. Principles of propagation by seed.6. Principles of seed selection, techniques of seed production and handling.7. Seed quality and its significance.8. Propagation by cuttings.9. Propagation by layering.10. Propagation by grafting and budding.11. Top working and frame working.12. Protocol for establishing mother stool beds of clonal rootstocks.13. Propagation through specialized organs.14. Micro-propagation.15. Propagation structures.16. Nursery management practices.17. Establishing bud wood bank or mother tree orchard.18. Establishing clonal rootstock mother stool beds and seed orchard.		

	<p>19. Clean Plant Network in fruit Nurseries. 20. Insect management in fruit Nurseries. 21. Disease management in fruit nurseries. 22. Record keeping and maintenance of nursery records.</p> <p>Practical:</p> <ol style="list-style-type: none"> 1. Hands on preparation of a concept layout plan for establishing a fruit nursery including material list and cost estimates. 2. Hands on preparation of land, seed and nursery beds and application of media, manures and fertilizers in seed/nursery beds. 3. Hands on collection of fruits for extraction of seeds, processing and storage of seed 4. Demonstration of seed scarification treatments for softening hard seed coat. 5. Demonstration of stratification for breaking seed dormancy. 6. Determining the quality of seeds using viability tests. 7. Preparation of PGR solutions and their application for enhancing seed germination. 8. Hands on preparation of stem cuttings, treatment of cuttings with PGR solutions and evaluation of different propagation media for better rooting in cuttings. 9. Practicing different methods of layering (air layering, tip layering, mound layering and trench layering). 10. Hands on different grafting techniques (tongue, cleft, wedge). 11. Protocol for propagation of temperate fruit crops through micro-propagation or tissue culture technique. 12. Practicing epicotyl grafting. 13. Hands on different methods of budding (chip and shield budding). 14. Demonstration of special intercultural nursery operations (De-suckering/de-shooting, staking and single stemming) for production of quality planting material. 15. Demonstration of nursery management practices (weed management, water and nutrient management). 16. Establishment and management including virus indexing of mother tree orchard or bud-wood bank. 17. Identification of various nursery pests and their management. 18. Identification of various diseases in the nursery and their management. 19. Acquaintance with the procedure for collection, packing and storage of scion wood. 20. Hands on top working and frame working techniques. 21. Practicing repair grafting and bridge grafting techniques. 22. Development of protocol for production of feathered nursery plants. 23. Acquaintance with the procedure for uprooting, sorting, packing, labelling and sale of nursery plants.
7.	Name of the experts:
	<p>Internal</p> <ol style="list-style-type: none"> 1. Dr. D.P. Sharma, Professor and Head, Department of Fruit Science, Dr. YSP UHF, Nauni. 2. Dr. Pramod Verma, Assistant Professor, Department of Fruit Science, Dr. YSP UHF, Nauni. 3. Dr. N.C. Sharma, Associate Professor, Department of Fruit Science, Dr. YSP UHF, Nauni. 4. Dr. B.S. Dilt, Professor, Department of Seed Science, Dr. YSP UHF, Nauni.

5. Dr. Rohit, Assistant Professor, Department of Seed Science and Technology, Dr. YSP UHF, Nauni.
6. Dr.Chuni Lal Sharma, Scientist, Department of Seed Science, Dr. YSP UHF, Nauni.
7. Dr.Gopal Singh , Scientist, Department of Fruit Science, Dr. YSP UHF, Nauni.
8. Dr. Jitender Chauhan, Principal Scientist and Head, KVK, Kandaghat.
9. Dr. Pramod Kumar, Sr. Scientist, Department of Fruit Science, Dr. YSP UHF, Nauni.
10. Dr. Rajneesh Sharma, Assoc. Professor and Head, Department of Biotechnology, Dr. YSP UHF, Nauni.
11. Dr. Manisha Thakur, Assoc. Professor, Dept. of Biotechnology, Dr. YSP UHF, Nauni.
12. Dr. Suman Lata, Scientist (Fruit Science), RHR&TS, Dhaulakuan.
13. Dr. D.S. Thakur, Professor (Fruit Science), RHR&TS, Mashobra.
14. Ms. Neha Dhiman, Assistant Professor, Department of Fruit Science, Dr. YSP UHF, Nauni.
15. Dr. Anil Handa, Professor, Department of Plant Pathology, Dr. YSP UHF, Nauni.
16. Dr. Rakesh Kumar, Scientist, Department of Entomology, Dr. YSP UHF, Nauni.
17. Dr. Bhupesh Gupta, Sr. Scientist, Department of Plant Pathology, Dr. YSP UHF, Nauni.
18. Dr. Prem Prakash, Scientist, Department of SAF, Dr. YSP UHF, Nauni.
19. Dr. V.S. Rana, Professor, Department of Fruit Science, Dr. YSP UHF, Nauni.
20. Dr.Neena Chauhan, Sr. Scientist (Fruit Science), RHR&TS, Mashobra

External

1. Dr. Umang Bhardwaj, SMS, O/O Dy. Director, Horticulture, Solan.
2. Dr. R.M. Sharma, Principal Scientist, Division of Fruit Science, IARI, New Delhi.
3. Dr. B.S. Thakur, Former Professor and Head, Department of Seed Science, Dr. YSP UHF, Nauni.
4. Dr. N. Sharma, Former Dean COH, UHF, Nauni.
5. Dr. P.S. Chauhan, Former Dean COH, UHF, Nauni.
6. Dr. O.C. Sharma, Director CITH, Srinagar.
7. Dr. J.S. Chandel, Former Professor and Head, Department of Fruit Science, UHF, Nauni.
8. Sh. Karan Singh, Karan Nurseries, Dharon ki Dhar.
9. Sh. Raj Kumar, S. S. Nurseries, Kalaghat.
10. Dr. D.D. Sharma, Former Professor and Head, Department of Fruit Science UHF, Nauni.
11. Dr. Sajad Unnabi , Assoc.Professor, CITH, Srinagar (J&K)

8. Training Schedule:



Date	Topic	Scientist/Speaker
12-11-21	Establishing a nursery-what to consider	Dr. D.P. Sharma
13-11-21	Hands on preparation of a concept layout plan for establishing a fruit nursery including material list and cost estimates.	Dr. D.P. Sharma
20-11-21	Nursery registration, certification and recognition	Dr. Umang Bhardwaj
20-11-21	Hands on preparation of land, seed and nursery beds and application of media, manures and fertilizers in seed/nursery beds.	Dr. Pramod Verma

27-11-21	Seed quality and its significance.	Dr. Rohit Verma
27-11-21	Determining the quality of seeds using viability tests	Dr. Rohit Verma
03-12-21	Plant propagation and types	Dr. N.C. Sharma
03-12-21	Hands on collection of fruits for extraction of seeds, processing and storage of seed	Dr. B.S. Dilta
04-12-21	Principles of seed selection, techniques of seed production and handling	Dr. R.M. Sharma*
04-12-21	Demonstration of seed scarification treatments for softening hard seed coat	Dr.Chuni Lal Sharma
18-12-21	Principles of propagation by seed	Dr. B.S. Thakur
18-12-21	Propagation structures	Dr. Suman Lata
20-12-21	Demonstration of stratification for breaking seed dormancy	Dr. N.C. Sharma
23-12-21	Micro-propagation	Dr. Rajneesh Sharma
23-12-21	Protocol for propagation of temperate fruit crops through micro-propagation or tissue culture technique	Dr. Manisha Thakur
31-12-21	Acquaintance with the procedure for collection, packing and storage of scion wood	Dr. N.C. Sharma
31-12-21	Acquaintance with the procedure for uprooting, sorting, packing, labelling and sale of nursery plants	Dr. N.C. Sharma
01-01-22	Propagation by cuttings	Ms.Neha Dhiman
01-01-22	Preparation of PGR solutions and their application for enhancing seed germination	Dr. N. Sharma
07-01-22	Hands on different grafting techniques (tongue, cleft, wedge)	Dr. J.S. Chandel
14-01-22	Insect management in fruit Nurseries	Dr.Rakesh Kumar*
14-01-22	Identification of various nursery pests and their management	Dr. Rakesh Kumar*
17-01-22	Identification of various diseases in the nursery and their management	Dr.Bhupesh Gupta*
19-01-22	Clean Plant Network in fruit Nurseries	Dr. Anil Handa*
19-01-22	Establishment and management including virus indexing of mother tree orchard or bud-wood bank	Dr. Anil Handa*
21-01-22	Demonstration of special intercultural nursery operations (De-suckering/de-shooting, staking and single stemming) for production of quality planting material	Ms.Neha Dhiman*
02-02-22	Record keeping and maintenance of nursery records	Dr.Prem Prakash*
15-02-22	Disease management in fruit nurseries	Dr.Sajad Unnabi*
15-02-22	Hands on different methods of budding (chip and	Dr. N.C. Sharma

		shield budding)	
	17-02-22	Nursery beds and propagation media	Dr. Pramod Verma
	17-02-22	Procedure for collection of scion wood	Dr. Pramod Verma
	17-02-22	Demonstration of nursery management practices (weed management, water and nutrient management)	Dr. Pramod Verma
	19-02-22	Nursery management practices	Sh. Karan Singh
	19-02-22	Hands on preparation of stem cuttings, treatment of cuttings with PGR solutions and evaluation of different propagation media for better rooting in cuttings	Sh. Raj Kumar, SS Nurseries
	21-02-22	Establishing clonal rootstock mother stool beds and seed orchard	Dr. D.D. Sharma
	02-03-22	Propagation through specialized organs	Dr. Pramod Kumar
	03-03-22	Protocol for establishing mother stool beds of clonal rootstocks	Dr. P. S. Chauhan*
	03-03-22	Propagation by layering	Dr. P.S. Chauhan*
	05-03-22	Practicing different methods of layering (air layering, tip layering, mound layering and trench layering)	Dr.Gopal Singh
	11-03-22	Top working and frame working	Dr. Jitender Chauhan
	12-03-22	Propagation by grafting and budding	Dr. O.C. Sharma*
	17-03-22	Establishing bud wood bank or mother tree orchard	Dr. D.S. Thakur*
	17-03-22	Development of protocol for production of feathered nursery plants	Dr.Neena Chauhan*
	06-04-22	Practicing epicotyl grafting	Dr. J.S. Chandel
	*Lectures delivered online		
9.	Skill upgraded of the students	:	<ul style="list-style-type: none"> ➤ Collection, extraction, handling and treatments of seeds (scarification, stratification and chemical) for quality stock production. ➤ Preparation of cuttings, their treatment and use in commercial nursery production especially for Clonal rootstocks. ➤ Skill development in budding and grafting practices. ➤ Skill development in handling of scion wood and uprooted plants before sale. ➤ Management of a commercial fruit nursery.
10.	Outcome of the training	:	<ul style="list-style-type: none"> ➤ Development of skilled human resource for propagation and nursery management of temperate fruit crops. ➤ Development of skills and knowledge among the trainee students for establishment of Hi-Tech nurseries. ➤ Motivation of students to become entrepreneurs in the field of

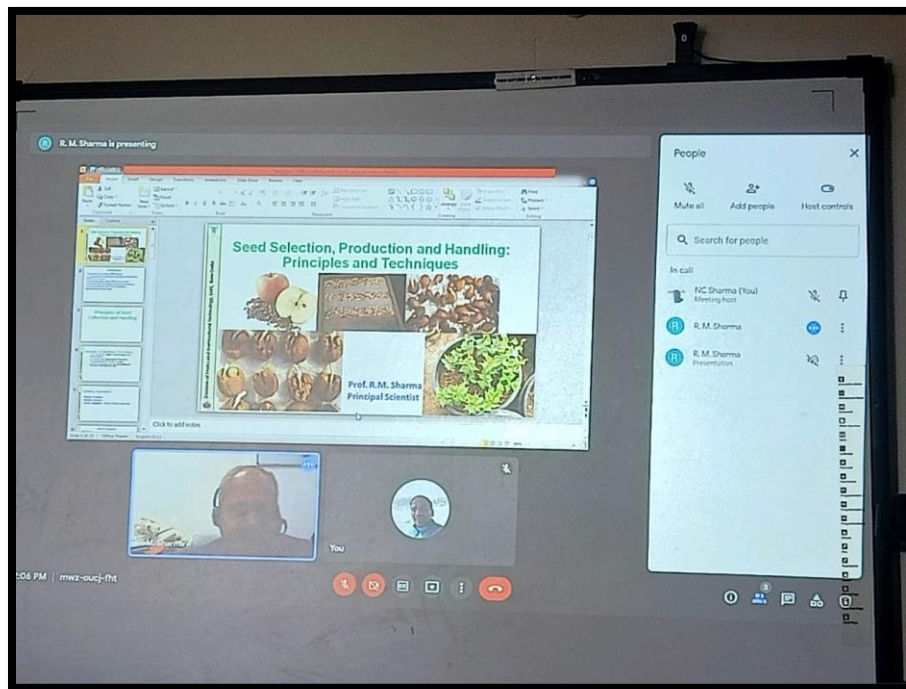
		<p>fruit nursery production and development of nursery production based entrepreneurs among the trainee students.</p> <p>➤ Involvement of skilled and qualified persons in the fruit nursery business and availability of quality planting material to the orchardists including fulfillment of their demands related to nursery plants.</p>
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| 11. | <p>Feedback of the students</p> <ol style="list-style-type: none"> 1. Trainees were with the opinion that they were motivated for commercial nursery production and to become entrepreneurs through this training programme. 2. Trainees were satisfied enough to have knowledge regarding nursery registration process for commercial nursery production. 3. As per trainees, hands on practices on various aspects of propagation and nursery management were useful enough to improve their skills and demanded to include more practical part in such trainings in future. 4. The trainees were happy to have motivational exposure visits to commercial nurseries and interaction with the owners of nurseries. They demanded to include more such visits in the future training programmes. 5. As per trainees, the communication and technical skills were improved during the training programme. 6. Majority of the trainee students demanded that such vocational courses should be the part of their degree programme and should be of longer duration as three months time period was not enough to learn highly technical things practically. 7. The trainee students advised that such type of vocational courses should be completely in offline mode as technical activities are difficult of understand through online mode. |
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12.	<p>Good quality photographs:</p> <div style="display: flex; justify-content: space-around;"> <div>  </div> <div>  </div> </div> <p>1a. (S S Nursery, Kalaghat) 1b. (Karan Nursery, Dharon Ki Dhar)</p> <p>1. Exposure visit to private nurseries</p>
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2. Practical demonstration by external expert



3. Online lecture by external experts



4. Offline lecture by internal experts

13.	Expenditure Details	Organization of One day workshop Honorarium to the experts Refreshment to the trainees Lunch for experts Training material Training manual Total	: 11521/- : 38000/- : 11640/- : 4120/- : 29520/- : 48720/- : 1,43,521/-
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14. Summary and conclusion:

The vocational certificate course on “Nursery Production of Temperate Fruits” was organized by Department of Fruit Science under IDP-NAHEP w.e.f. November, 2021 to April. The course comprises of theory and practical components covering all aspects of nursery production like layout of nursery, multiplication of rootstocks, different sexual and asexual propagation methods, nursery management practices, nursery registration and accreditation etc. Before start of the course, a workshop was organized in the Department of Fruit Science on 31-03-2021 for finalization of course curriculum. All the faculty members of the Department of Fruit Science participated in this workshop and Dr. JS Chandel, Profesor and Head (Retd), Fruit Science and Dr. B.S. Thakur, Professor and Head (Retd.), Seed Science and Technology were invited experts outside the university. Twenty one students of B.Sc. Horticulture (Hons) from College of Horticulture, Dr. YS Parmar University of Horticulture and Forestry opted for this course. The certificate course on “Nursery Production of Temperate Fruits” was started with inaugural lecture of Dr DP Sharma, Professor and Head, Department of Fruit Science, UHF, Nauni on 12-11-2021. Thereafter a series of lectures/practical on various aspects of propagation and nursery management were delivered in an online and offline mode by distinguished experts of Fruit Science including Experts from IARI, New Delhi and CITH, Srinagar. In total 41 lectures (theory+practical) were delivered and two field visits to Karan Nursery, Dharon ki Dhar and SS Nurseries, Kalaghat were also organized. A Training manual on “Nursery Production of Temperate Fruits” has also been prepared and published under this programme. Organization of such vocational courses are highly beneficial to the students to improve their technical skills and motivate them to become entrepreneurs and thereby the job providers rather than the job seekers. Such training programmes should also be organized to the educated unemployed rural youth.

(Naveen C. Sharma)
Activity Incharge