



## Integral University, Lucknow

<b>Effective from Session: 2023-24</b>							
<b>Course Code</b>	FSC 506	<b>Title of the Course</b>	Canopy Management in Fruit Crops	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Year</b>	II	<b>Semester</b>	III	1	0	2	2
<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>To make the students aware about the importance and factors affecting canopy development of fruit crops</li> <li>To impart knowledge about different canopy types, structures different methods of fruit crops</li> <li>To familiarize the students about training, pruning and nutrient management of fruit crops</li> <li>To know about canopy development and management in relation to growth, flowering, fruiting and fruit quality</li> </ul>						

Course Outcomes	
<b>CO1</b>	Student will have a basic awareness about different species, rootstock and varieties of fruit crops
<b>CO2</b>	The students will be able to know about different types of training and pruning
<b>CO3</b>	Student will be able to impart knowledge of about different plant growth regulators for canopy management
<b>CO4</b>	The students will be able to know about different canopy types on the production and quality of fruits

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	<b>Unit-I</b>	Introduction, Types and Classification: Canopy management – importance and factors affecting canopy development. Canopy types and structures, canopy manipulation for optimum utilization of light and its interception. Spacing and utilization of land area – Canopy classification.	8	CO1, CO2
2	<b>Unit-II</b>	Physical Manipulation and Growth Regulation: Canopy management through rootstock and scion. Canopy management through plant growth regulators, training and pruning and management practices. Canopy development and management in relation to growth, flowering, fruiting and fruit quality.	10	CO2, CO3, CO4

**Practicals:**

Study of different types of canopies, training of plants for different canopy types, canopy development through pruning; understanding bearing behavior and canopy management in different fruits; use of plant growth regulators, geometry of planting, development of effective canopy with support system, Study on effect of different canopy types on production and quality of fruits.	14	CO1, CO2, CO3, CO4
--	----	--------------------

**Reference Books:**

- Bakshi JC, Uppal DK and Khajuria HN. 1988. The Pruning of Fruit Trees and Vines. Kalyani Publishers, New Delhi.
- Chadha KL and Shikhamany SD. 1999. The Grape, Improvement, Production and Post-Harvest Management. Malhotra Publishing House, Delhi.
- Iyer CPA and Kurian RM. 2006. High Density Planting in Tropical Fruits: Principles and Practices. IBDC Publishers, New Delhi
- Pradeepkumar T. 2008. Management of Horticultural Crops. NIPA, New Delhi
- Singh G. 2010. Practical Manual on Canopy Management in Fruit Crops. Dept. of Agriculture and Co-operation, Ministry of Agriculture (GoI), New Delhi.
- Srivastava KK. 2012. Canopy Management in Fruits. ICAR, New Delhi

**e-Learning Source:**

- [https://agricoop.nic.in/sites/default/files/ICAR\\_9.pdf](https://agricoop.nic.in/sites/default/files/ICAR_9.pdf)
- <http://ecoursesonline.iasri.res.in/mod/page/view.php?id=96732>

PO-PSO CO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
<b>CO1</b>	3	2	1	3	3	1	3	1	1	3	3	2	3	2	3			
<b>CO2</b>	2	3	2	2	3	2	2	1	1	1	2	3	3	3	2			
<b>CO3</b>	3	2	1	1	3	1	3	2	1	2	3	3	2	2	3			
<b>CO4</b>	2	2	1	3	3	2	2	1	1	1	1	2	3	3	3			
<b>CO5</b>	3	2	1	3	3	1	3	2	1	1	3	3	3	3	3			

**1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**



## Integral University, Lucknow

<b>Effective from Session: 2023-24</b>							
<b>Course Code</b>	VSC 513	<b>Title of the Course</b>	Processing of Vegetable	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Year</b>	II	<b>Semester</b>	III	1	0	2	2
<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>To update knowledge on the recent research trends in the field of Vegetable preservation</li> <li>Familiarization with different methods of quality control and value addition</li> <li>Knowledge of processing equipments and principles of preservation</li> </ul>						

Course Outcomes	
<b>CO1</b>	The students will be able to understand about the present status of vegetable preservation
<b>CO2</b>	Student will have a basic knowledge about the spoilage and biochemical changes in fresh and processed vegetable produce
<b>CO3</b>	After the course, student will be able to impart theoretical knowledge and practical skills about preservation of vegetables
<b>CO4</b>	Students can learn about the processing equipments
<b>CO5</b>	Students will get familiarized about the conceptualize about different aspects quality control and value addition

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	<b>Unit-I</b>	Present status—Present status and future prospects of vegetable preservation industry in India	3	CO1
2	<b>Unit-II</b>	Spoilage and biochemical changes—Spoilage of fresh and processed vegetable produce; biochemical changes and enzymes associated with spoilage of vegetable produce; Principal spoilage organisms, food poisoning and their control measures; Role of microorganisms in food preservation	7	CO2, CO3
3	<b>Unit-III</b>	Processing equipments—Raw material for processing; Primary and minimal processing; Processing equipments; Layout and establishment of processing industry; FPO licence; Importance of hygiene; Plant sanitation	7	CO2, CO3, CO4
4	<b>Unit-IV</b>	Quality control—Quality assurance and quality control, TQM, GMP; Food standards- FPO, PFA, etc.; Food laws and regulations; Food safety- hazard analysis and critical control points (HACCP); Labeling and labeling act and nutrition labeling	6	CO4, CO5
5	<b>Unit-V</b>	Value addition—Major value-added vegetable products; Utilization of byproducts of vegetable processing industry; Management of processing industry waste; Investment analysis; Principles and methods of sensory evaluation of fresh and processed vegetables	7	CO3, CO4, CO5

**Practicals:**

Study of machinery and equipments used in processing of vegetable produce; Chemical analysis for nutritive value of fresh and processed vegetable; Study of different types of spoilage in fresh as well as processed vegetable produce; Classification and identification of spoilage organisms; Study of biochemical changes and enzymes associated with spoilage; Laboratory examination of vegetable products; Sensory evaluation of fresh and processed vegetables; Study of food standards- National, international, CODEX Alimentarius; Visit to processing units to study the layout, hygiene, sanitation and waste management.	16	CO1, CO2, CO3, CO4, CO5
---	----	-------------------------

**Reference Books:**

• Arthey D and Dennis C. 1996. Vegetable processing. Blackie/ Springer-Verlag.
• Chadha DS. 2006. The Prevention of food adulteration act. Confed. of Indian Industry.
• Desrosier NW. 1977. Elements and technology. AVI Publ. Co.
• FAO. 1997. Fruit and Vegetable processing. FAO.
• FAO. CODEX Alimentarius; Joint FAO/ WHO food standards programme. 2nd Ed. Vol. VB. tropical fresh fruits and vegetables. FAO.
• FAO. Food quality and safety systems- training manual on food hygiene and haccp. FAO.
• Fellow's P. 1988. Food processing technology. Ellis Horwood International.
• Frazier WC and Westhoff DC. 1995. Food microbiology. 4th Ed. Tata McGraw Hill.
• Giridharilal GS Siddappa and Tandon GL. 1986, Preservation of fruits and vegetables. ICAR.
• Gisela J. 1985. Sensory evaluation of food- theory and practices. Ellis Horwood.
• Graham HD. 1980. Safety of foods. AVI Publ. Co.
• Hildegrade H and Lawless HT. 1997. Sensory evaluation of food. CBS.
• Joslyn M and Heid Food processing operations. AVI Publ. Co.
• Mahindru SN. 2004. Food safety: concepts and reality. APH Publ. Corp.
• Ranganna S. 1986. Handbook of analysis and quality control for fruit and vegetable products. 2nd Ed. Tata-McGraw Hill.
• Shapiro R. 1995. Nutrition labeling handbook. Marcel Dekker.
• Srivastava RP and Kumar S. 2003. Fruit and vegetable preservation: principles and practices. 3rd Ed. International Book Distri. Co.
• Tressler and Joslyn MA. 1971. Fruit and vegetable juice processing technology. AVI Publ. Co.
• Verma LR and Joshi VK. 2000. Postharvest technology of fruits and vegetables: handling, processing, fermentation and waste management. Indus Publ. Co.

**e-Learning Source:**


Course Articulation Matrix: (Mapping of COs with POs and PSOs)																		
PO- PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	2	2	2	2	2	1	3	3	2	2	2	3	2			
CO2	3	3	3	3	3	3	3	3	3	2	3	3	1	1	3			
CO3	2	3	1	3	3	2	3	3	3	3	3	1	3	3	3			
CO4	2	2	2	2	2	2	2	3	2	1	2	2	3	2	1			
CO5	3	2	3	2	2	3	2	3	3	3	2	3	1	3	2			

**1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**



## Integral University, Lucknow

<b>Effective from Session:</b> 2023-24							
<b>Course Code</b>	PHM 501	<b>Title of the Course</b>	Postharvest Management of Horticultural Produce	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Year</b>	II	<b>Semester</b>	III	2	0	2	3
<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>To impart comprehensive knowledge on management of horticultural produce thus extending the post-harvest life of the produce by various treatments</li> </ul>						

Course Outcomes	
<b>CO1</b>	Students will get familiarized with the importance and scope of Postharvest technology.
<b>CO2</b>	The students are expected to be able to understand the regulation of ripening by use of chemicals and growth regulators
<b>CO3</b>	Students will be able to know about the equipments and methods used for Pre and Post harvesting
<b>CO4</b>	Students will be able to know about the Pre and Postharvest treatments for extending storage life/ vase life
<b>CO5</b>	After this course, the students will have a clear and comprehensive understanding of postharvest deteriorative factors necessary to overcome these challenges.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	<b>Unit-I</b>	History, Importance and scope of Postharvest technology of horticultural produce. Nature and structure of horticultural produce. Pre and Postharvest losses and their causes.	5	CO1
2	<b>Unit-II</b>	Climacteric and non-climacteric fruits. Regulation of ripening by use of chemicals and growth regulators. Control of sprouting, rooting and discoloration in vegetables.	5	CO2
3	<b>Unit-III</b>	Maturity indices for harvest. Harvesting and harvesting tools. Curing in roots and tubers. Prepackage Operation: Precooling, washing, sorting, grading of horticultural perishables for local markets and export. Postharvest handling of spices, plantation crops, medicinal and aromatic plants. Equipments for washing, sizing, grading.	8	CO3
4	<b>Unit-IV</b>	Pre and Postharvest treatments for extending storage life/ vase life. VHT, irradiation treatment, skin coating, degreening, etc. Prepackaging, Packaging techniques for local market and export. Standards and specifications for fresh produce.	7	CO4
5	<b>Unit-V</b>	Postharvest handling system for horticulture crops of regional importance. Principles of transport, modes of transportation, types of vehicles and transit requirements for different horticultural produce. Marketing: Factors influencing marketing of perishable crops, marketing systems and organizations.	6	CO5

**Practicals:**

Study of maturity indices for harvest of fruits, vegetables, spices and plantation crops; Protective skin coating with wax emulsion and pre and Postharvest treatment with fungicides, chemicals and growth regulators to extend the shelf life of fruits and vegetables; Prepackaging of perishables; Extension of vase life of cut flowers by use of chemicals and growth regulators; Control of sprouting of potato and onion by using growth regulators; Study of modern harvesting, sorting and grading equipments; Study of effect of pre-cooling on shelf-life and quality of fresh fruits, vegetables and flowers; Visit to packaging centers; Visit to local markets, cooperative organizations, super markets dealing with marketing of Perishables.	14	CO1, CO2, CO3, CO4, CO5
--	----	-------------------------

**Reference Books:**

- Bhattacharjee SK and Dee LC. 2005. Postharvest technology of flowers and ornamental plants. Pointer Publishers, Jaipur.
- Chattopadhyay SK. 2007. Handling, transportation and storage of fruit and vegetables. Gene-Tech books, New Delhi.
- FAO. 2007. Handling and Preservation of Fruits and Vegetables by Combined methods for Rural Areas-Technical Manual. FAO Agr. Ser. Bull., 149.
- Sudheer KP, Indira V. 2007. Postharvest Technology of Horticultural Crops, Peter K.V. (Ed.), New India Publishing Agency, ISBN 9788189422431.
- Sunil Pareek (Ed.) 2016. Postharvest Ripening Physiology of Crops, CRC Press, ISBN 9781498703802.
- Thompson AK. (Ed.) 2014. Fruit and Vegetables: Harvesting, Handling and Storage (Vol. 1 & 2) Blackwell Publishing Ltd, Oxford, UK. ISBN: 9781118654040.

**e-Learning Source:**

Horticulture-Post harvest management CSIR-NISTADS <http://www.nistads.res.in/indiasnt2008/t6rural/t6rur13.htm>

Post-harvest Technology- MANAGE <http://www.manage.gov.in/ftf-it/prgReports/ihr.pdf>

Role of post-harvest management <http://www.fao.org/3/y5431e/y5431e02.htm>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)																		
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	<b>CO1</b>	3	2	1	3	3	1	3	1	1	3	3	2	3	2	3		
<b>CO2</b>	2	3	2	2	3	2	2	1	1	1	2	3	3	3	2			
<b>CO3</b>	3	2	1	1	3	1	3	2	1	2	3	3	2	2	3			
<b>CO4</b>	2	2	1	3	3	2	2	1	1	1	1	2	3	3	3			
<b>CO5</b>	3	2	1	3	3	1	3	2	1	1	3	3	3	3	3			

**2- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**



## Integral University, Lucknow

<b>Effective from Session:</b> 2018-19							
<b>Course Code</b>	PGS501	<b>Title of the Course</b>	Library and Information Services	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Year</b>	II	<b>Semester</b>	III	0	0	2	1
<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>To study about the role of library in education, research and technology</li> <li>To obtain idea of Intricacies of abstracting and indexing services and to enlighten the students about the computerized library services</li> <li>To give the knowledge of e resources and search engines</li> </ul>						

Course Outcomes	
<b>CO1</b>	The students will gain the knowledge about the library importance in different sites
<b>CO2</b>	They gain knowledge of Intricacies of abstracting and indexing services
<b>CO3</b>	They know about the computerized library services
<b>CO4</b>	To provide knowledge of e resources
<b>CO5</b>	To give basic information about search engines

Practicals:		
	Contact Hrs.	Mapped CO
Introduction to library and its services; Role of libraries in education, research and technology transfer; Classification systems and organization of library; Sources of information- Primary Sources, Secondary Sources and Tertiary Sources; Intricacies of abstracting and indexing services (Science Citation Index, Biological Abstracts, Chemical Abstracts, CABI Abstracts, etc.); Tracing information from reference sources; Literature survey; Citation techniques/Preparation of bibliography; Use of CD-ROM Databases, Online Public Access Catalogue and other computerized library services; Use of Internet including search engines and its resources; e-resources access methods.	16	CO1, CO2, CO3, CO4, CO5

Reference Books:
<ul style="list-style-type: none"> <li>Singh G. Information Sources, Services and Systems, 2013 Edition. Prentice Hall India Learning Private Limited</li> <li>Library Science, 2018 Edition. Ramesh Publishing House</li> <li>Subhankar Biswas, Durga Sankar Rath. Cataloguing in the New Era: Gazing through the Bodleian Catalogues to RDA, 2017 Edition. Ess Ess Publications</li> </ul>

e-Learning Source:
<a href="https://www.youtube.com/watch?v=jQlGmtY3sUw">https://www.youtube.com/watch?v=jQlGmtY3sUw</a> (Role of libraries in education, research and technology transfer)

Course Articulation Matrix: (Mapping of COs with POs and PSOs)																			
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
	<b>CO1</b>	3	3	1	1	1	3	3	3	2	3	1		2	1	1	2		
<b>CO2</b>	3	3	1	3	3	3	1	3	2	3	2		1	1	2	1			
<b>CO3</b>	3	2	1	3	3	2	1	3	2	1	1		2	2	1	1			
<b>CO4</b>	3	2	1	3	3	3	1	3	2	2	3		3	1	1	2			
<b>CO5</b>	3	1	1	3	3	3	1	3	2	2	1		2	1	1	1			

**1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**