



Integral University, Lucknow

Effective from Session: 2023-24							
Course Code	VSC 509	Title of the Course	Production of Underutilized Vegetable Crops	L	T	P	C
Year	II	Semester	III	2	0	2	3
Course Objectives	<ul style="list-style-type: none"> To know about the importance and historical knowledge of underutilized vegetable crops To impart comprehensive knowledge about the scientific production technology of lesser utilized vegetable crops Knowledge of crop protection measure in different crops 						

Course Outcomes	
CO1	Student will have a basic knowledge about the importance and management of underutilized vegetable crops grown in India
CO2	Student will be able to impart knowledge of varietal importance to improve the production and quality of underutilized vegetables
CO3	After the course, student will be able to calculate the agro-chemical doses to control biotic stresses
CO4	Students can identify and control measures of important physiological disorders
CO5	By the end of course students will have the idea of production methods of different lesser utilized vegetable crops

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Unit-I	Importance and scope, botany and taxonomy, climate and soil requirement, commercial varieties/ hybrids, improved cultural practices, physiological disorders, harvesting and yield, plant protection measures and post-harvest management of: Stem and bulb crops—Asparagus, leek and Chinese chive	6	CO1, CO2, CO3, CO4, CO5
2	Unit-II	Importance and scope, botany and taxonomy, climate and soil requirement, commercial varieties/ hybrids, improved cultural practices, physiological disorders, harvesting and yield, plant protection measures and post-harvest management of: Cole and salad crops—Red cabbage, Chinese cabbage, kale, sweet corn and baby corn.	6	CO1, CO2, CO3, CO4, CO5
3	Unit-III	Importance and scope, botany and taxonomy, climate and soil requirement, commercial varieties/ hybrids, improved cultural practices, physiological disorders, harvesting and yield, plant protection measures and post-harvest management of: Leafy vegetables—Celery, parsley, Indian spinach (poi), spinach, chenopods, Chekkurmanis and indigenous vegetables of regional importance.	6	CO1, CO2, CO3, CO4, CO5
4	Unit-IV	Importance and scope, botany and taxonomy, climate and soil requirement, commercial varieties/ hybrids, improved cultural practices, physiological disorders, harvesting and yield, plant protection measures and post-harvest management of: Gourds and melons—Sweet gourd, spine gourd, teasle gourd, round gourd, and little/ Ivy gourd, snake gourd, pointed gourd, kachri, long melon, snap melon and gherkin	6	CO1, CO2, CO3, CO4, CO5
5	Unit-V	Importance and scope, botany and taxonomy, climate and soil requirement, commercial varieties/ hybrids, improved cultural practices, physiological disorders, harvesting and yield, plant protection measures and post-harvest management of: Yam and beans—Elephant foot yam, yam, yam bean, lima bean and winged bean	6	CO1, CO2, CO3, CO4, CO5

Practicals:

Identification and botanical description of plants and varieties; Seed/ planting material; Production, lay out and method of planting; Important cultural operations; Identification of important pests and diseases and their control; Maturity standards and harvesting; Visit to local farms.	16	CO1, CO2, CO3, CO4, CO5
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Reference Books:

- Bhat KL. 2001. Minor vegetables-untapped potential. Kalyani publishers, New Delhi.
- Indira P and Peter KV. 1984. Unexploited tropical vegetables. Kerala agricultural university, Kerala.
- Pandey AK. 2011. Aquatic vegetables. Agrotech publisher academy, New Delhi.
- Peter KV. (Eds.). 2007-08. Underutilized and underexploited horticultural crops. Vol.1-4, New India publishing agency, Lucknow
- Peter KV and Hazra P. (Eds). 2012. Hand book of vegetables. Studium Press LLC, P.O. Box 722200, Houston, Texas 77072, USA, 678p
- Peter KV and Hazra P. (Eds). 2015. Hand book of vegetables Volume II and III. Studium press LLC, P.O. Box 722200, Houston, Texas 77072, USA, 509 p.
- Rana MK. 2018. Vegetable crop science. CRC Press Taylor and Francis Group 6000 Broken Sound Parkway NW, Suite 300 Boca Raton, FL 33487-2742 ISBN: 978-1-1380-3521-8
- Rubatzky VE and Yamaguchi M. 1997. World vegetables: vegetable crops. NBPGR, New Delhi.

e-Learning Source:

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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	3	3	2	1	2	2	2	3	3	2	2	1			
CO2	3	3	3	3	1	1	2	1	3	2	3	2	2	3	2			

C03	3	2	3	3	3	1	2	2	2	3	3	3	2	1	2			
C04	3	2	2	3	3	2	1	3	3	3	3	3	2	3	2			
C05	3	2	3	3	3	1	2	2	3	3	3	3	2	1	2			

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



Integral University, Lucknow

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

Course Outcomes	
CO1	The students will be able to understand about the present status of vegetable preservation
CO2	Student will have a basic knowledge about the spoilage and biochemical changes in fresh and processed vegetable produce
CO3	After the course, student will be able to impart theoretical knowledge and practical skills about preservation of vegetables
CO4	Students can learn about the processing equipments
CO5	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	Unit-I	Present status—Present status and future prospects of vegetable preservation industry in India	3	CO1
2	Unit-II	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	Unit-III	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	Unit-IV	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	Unit-V	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
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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

Effective from Session: 2023-24							
Course Code	FSC 510	Title of the Course	Organic Fruit Culture	L	T	P	C
Year	II	Semester	III	2	0	2	3
Course Objectives	<ul style="list-style-type: none"> Understanding the principle, theoretical aspects and developing skills in organic cultivation of fruit crops. Knowing about the organic cultivation practices of fruits 						

Course Outcomes	
CO1	Students will be able to know principles and current scenario of organic production of fruits
CO2	Familiarized with organic farming system and practices for fruits
CO3	The students will get the knowledge about the inspection, control measures and certification of organic fruit produce

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Unit-I	Principles and Current Scenario: Organic horticulture, scope, area, production and world trade, definition, principles, methods and SWOT analysis.	5	CO1
2	Unit-II	Farming System and Practices: Organic farming systems including biodynamic farming, natural farming, homa organic farming, rishi krishi, EM technology, cosmic farming; on-farm and off-farm production of organic inputs, role of bio-fertilizers, bio enhancers, legumes, inter cropping, cover crops, green manuring, zero tillage, mulching and their role in organic nutrition management. Organic seeds and planting materials, soil health management in organic production, weed management practices in organic farming, biological management of pests and diseases, trap crops, quality improvement in organic production of fruit crops.	12	CO2
3	Unit-III	Inspection, Control Measures and Certification: Inspection and certification of organic produce, participatory guarantee system (PGS), NPOP, documentation and control, development of internal control system (ICS), Concept of group certification, constitution of grower group as per NPOP, preparation of ICS manual, internal and external inspection, concept of third party verification, certification of small farmer groups (Group Certification), transaction certificate, group certificate, critical control points (CCP) and HACCP, IFOAM guidelines on certification scope and chain of custody, certification trademark – The Logo, accredited certification bodies under NPOP. Constraints in certification, IFOAM and global scenario of organic movement, postharvest management of organic produce. Economics of organic fruit production.	14	CO3

Practicals:				
Design of organic orchards/ farms management; Conversion plan; Nutrient management and microbial assessment of composts and bio-enhancers; Preparation and application of composts, bio-enhancers and bio-pesticides; Organic nursery raising; Application of composts, bio-enhancers, bio-fertilisers and bio-pesticides, green manure, cover, mulching; Preparation and use of neem based products; Biodynamic preparations and their role in organic agriculture, EM technology and products, biological/ natural management of pests and diseases; Soil solarization; Frame work for GAP; Documentation for certification			16	CO1, CO2, CO3

Reference Books:				
<ul style="list-style-type: none"> Claude A. 2004. The Organic Farming Sourcebook. Other India Press, Mapusa, Goa, India. Dabholkar SA. 2001. Plenty for All. Mehta Publishing House, Pune, Maharashtra. Das HC and Yadav AK. 2018. Advances in Organic Production of Fruit Crops. Westville Publishing House, New Delhi. Deshpande MS. 2003. Organic Farming with respect to Cosmic Farming. Mrs. Pushpa Mohan Deshpandey, Kolhapur, Maharashtra. Deshpande WR. 2009. Basics of Organic Farming. All India Biodynamic and Organic Farming Association, Indore. MP. Gaur AC, Neblakantan S and Dargan KS. 1984 Organic Manures. ICAR, New Delhi. Lampkin, N. and Ipswich, S. 1990. Organic Farming. Farming Press. London, UK. Lind K, Lafer G, Schloffer K, Innershofer G and Meister H. 2003. Organic Fruit Growing. CAB International. Palaniappan SP and Annadurai K. 2008. Organic Farming- Theory and Practice. Scientific Publishers, Jodhpur, Rajasthan, India. Palekar S. 2004. The Technique of Spritual Farming. Chandra Smaritee, Sai Nagar, Amrawati, Maharashtra. Proctor P. 2008. Biodynamic Farming and Gardening. Other India Press, Mapusa, Goa. Ram RA and Pathak RK. 2017. Bioenhancers. Lap Lambert Academic Publishing, AP. 				

e-Learning Source:

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	CO1	2	3	2	3	2	2	2	2	3	2	2	2	2	3	2		
CO2	3	3	3	3	3	3	3	3	3	3	3	1	3	1	1			
CO3	3	3	1	3	3	1	3	3	3	3	3	3	1	3	3			

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



Integral University, Lucknow

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

Course Outcomes	
CO1	The students will gain the knowledge about the library importance in different sites
CO2	They gain knowledge of Intricacies of abstracting and indexing services
CO3	They know about the computerized library services
CO4	To provide knowledge of e resources
CO5	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:	
	• Singh G. Information Sources, Services and Systems, 2013 Edition. Prentice Hall India Learning Private Limited
	• Library Science, 2018 Edition. Ramesh Publishing House
	• Subhankar Biswas, Durga Sankar Rath. Cataloguing in the New Era: Gazing through the Bodleian Catalogues to RDA, 2017 Edition. Ess Ess Publications

e-Learning Source:	
	https://www.youtube.com/watch?v=jQIGmtY3sUw (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
	CO1	3	3	1	1	1	3	3	3	2	3	1	2	1	1	1		
CO2	3	3	1	3	3	3	1	3	2	3	2	1	1	1	1			
CO3	3	2	1	3	3	2	1	3	2	1	1	2	1	1	1			
CO4	3	2	1	3	3	3	1	3	2	2	2	1	1	1	1			
CO5	3	1	1	3	3	3	1	3	2	2	1	1	1	1	1			

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