

**MRSPTU M.SC. (HORTICULTURE) VEGETABLE SCIENCE  
SYLLABUS 2022 BATCH ONWARDS**

**Total Credits= 16**

Semester 1 <sup>ST</sup>		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
MHRSTS2-101	Production Technology of Winter Season Vegetable Crops	2	-	-	40	60	100	2
MHRSTS2-102	Production Technology of Summer Season Vegetable Crops	2	-	-	40	60	100	2
MHRSTS2-103	Breeding of Self Pollinated and Vegetatively Propagated Vegetable Crops	2	-	-	40	60	100	2
MHRSTS2-104	Technical Writing and Communication Skills, Library and Information Services	2	-	-	40	60	100	2
MHRSTS2-105	Intellectual Property Management, Biodiversity and Biosafety	2	-	-	40	60	100	2
MHRSTS2-106	Production Technology of Winter Season Vegetable Crops lab	-	-	2	60	40	100	1
MHRSTS2-107	Production Technology of Summer Season Vegetable Crops lab	-	-	2	60	40	100	1
MHRSTS2-108	Breeding of Self Pollinated and Vegetatively Propagated Vegetable Crops lab	-	-	2	60	40	100	1
MHRSTS2-109	Technical Writing and Communication Skills, Library and Information Services lab	-	-	2	60	40	100	1
MHRSTS2-110	Master's research	-	-	4	-	-	-	2
<b>Total</b>		<b>10</b>	<b>-</b>	<b>12</b>	<b>440</b>	<b>460</b>	<b>900</b>	<b>16</b>

**MRSPTU M.SC. (HORTICULTURE) VEGETABLE SCIENCE  
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**Total Credits= 18**

Semester 2 <sup>nd</sup>		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
MHRTS2-201	Breeding of Cross Pollinated Vegetable Crops	2	-	-	40	60	100	2
MHRTS2-202	Systematics of Vegetable Crops	2	-	-	40	60	100	2
MHRTS2-203	Statistical Methods for Research Workers	2	-	-	40	60	100	2
MHRTS2-204	Principles of Plant Breeding	2	-	-	40	60	100	2
MHRTS2-205	Breeding of Cross Pollinated Vegetable Crops lab	-	-	2	60	40	100	1
MHRTS2-206	Systematics of Vegetable Crops lab	-	-	2	60	40	100	1
MHRTS2-207	Statistical Methods for Research Workers lab	-	-	2	60	40	100	1
MHRTS2-208	Principles of Plant Breeding Lab	-	-	2	60	40	100	1
MHRTS2-209	Master's research	-	-	12	-	-	-	6
<b>Total</b>		<b>8</b>	<b>-</b>	<b>20</b>	<b>400</b>	<b>400</b>	<b>800</b>	<b>18</b>

**MRSPTU M.SC. (HORTICULTURE) VEGETABLE SCIENCE  
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**Total Credits= 18**

Semester 3 <sup>rd</sup>		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
MHRSTS2-301	Organic Vegetable Production Technology	2	-	-	40	60	100	2
MHRSTS2-302	Post-harvest Handling of Vegetable Crops	2	-	-	40	60	100	2
MHRSTS2-303	Breeding Field Crops	2	-	-	40	60	100	2
MHRSTS2-304	Principles of Genetics	2	-	-	40	60	100	2
MHRSTS2-305	Organic Vegetable Production Technology (practical)	-	-	2	60	40	100	1
MHRSTS2-306	Post-harvest Handling of Vegetable Crops(practical)	-	-	2	60	40	100	1
MHRSTS2-307	Analytical Techniques and Instrumental Methods in Soil and Plant Analysis(practical)	-	-	2	60	40	100	1
MHRSTS2-308	Management of Problem Soils and Water(practical)	-	-	2	60	40	100	1
MHRSTS2-309	Master's research	-	-	12	-	-	-	6
<b>Total</b>		<b>8</b>	<b>-</b>	<b>20</b>	<b>400</b>	<b>400</b>	<b>800</b>	<b>18</b>

**Total Credits= 16**

Semester 4 <sup>th</sup>		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
MHRSTS2-401	Master Seminar	-	-	-	100	100	200	3
MHRSTS2-402	Research and Publication Ethics	1	-	-	40	60	100	1
MHRSTS2-403	Research and Publication Ethics (practical)	-	-	2	60	40	100	1
MHRSTS2-404	Master's research	-	-	22	-	-	-	11
<b>Total</b>		<b>1</b>	<b>-</b>	<b>24</b>	<b>200</b>	<b>200</b>	<b>400</b>	<b>16</b>

**MRSPTU M.SC. (HORTICULTURE) VEGETABLE SCIENCE  
SYLLABUS 2022 BATCH ONWARDS**

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**Overall Marks / Credits**

<b>Semester</b>	<b>Marks</b>	<b>Credits</b>
1 <sup>st</sup>	900	16
2 <sup>nd</sup>	800	18
3 <sup>rd</sup>	800	18
4 <sup>th</sup>	400	16
<b>Total</b>	<b>2900</b>	<b>68</b>

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**MRSPTU M.SC. (HORTICULTURE) VEGETABLE SCIENCE  
SYLLABUS 2022 BATCH ONWARDS**

**PRODUCTION TECHNOLOGY OF WINTER SEASON VEGETABLE CROPS**

<b>Subject Code: MHRTS2-101</b>	<b>L T P C</b>	<b>Duration: 30 (Hrs.)</b>
	2 0 0 2	

**Course Objectives:**

1. To teach learners about the taxonomy, botany, and nutritional value of vegetables grown in various places.
2. Students will study various vegetable post-harvesting methods and plant protection strategies.
3. Providing information on the winter crop seed production process.

**Course Outcomes:**

1. To impart knowledge to students about the botany, taxonomy and nutritional value of vegetables growing in different regions.
2. Students will learn about different plant protection measures and post harvesting techniques in vegetables.
3. Providing knowledge of seed production of winter season crops.

**Mapping**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2											
CO2				2								
CO3			3									

**UNIT-I (8 Hours)**

Introduction, nutritional value, origin, botany and taxonomy, important countries and states growing vegetables along with area, climate and soil requirements

**UNIT-II (8 Hours)**

Commercial varieties/hybrids evolved by private and public sector, sowing/ transplanting time, seed rate and seed treatment, nutritional and irrigation requirements,

**UNIT-III (7 Hours)**

Chemical weed control, mulching, physiological disorders, harvesting techniques, postharvest management, plant protection measures and seed production of potato

**UNIT-IV (7 Hours)**

Seed production of cole crops; cabbage, cauliflower, knol khol, broccoli, brussels' sprout, chinese cabbage, root crops; carrot, radish, turnip, beet root, bulb crops; onion and garlic, peas and beans, green leafy cool season vegetables.

**Recommended Text Books / Reference Books:**

1. Bose TK & Som MG. (Eds.). 1986. Vegetable Crops in India. Naya Prokash.
2. Bose TK, Som G & Kabir J. (Eds.). 2002. Vegetable Crops. Naya Prokash.
3. Chadha KL & Kalloo G. (Eds.). 1993-94. Advances in Horticulture Vols. V-X. Malhotra Publ. House.
4. Chadha KL. (Ed.). 2002. Hand Book of Horticulture.
5. ICAR. Chauhan DVS. (Ed.). 1986. Vegetable Production in India. Ram Prasad & Sons.

**MRSPTU M.SC. (HORTICULTURE) VEGETABLE SCIENCE  
SYLLABUS 2022 BATCH ONWARDS**

**PRODUCTION TECHNOLOGY OF SUMMER SEASON VEGETABLE CROPS**

**Subject Code: MHRTS2-102**

**L T P C**  
2 0 0 2

**Duration: 30(Hrs.)**

**Course Objectives:**

1. To teach learners about the nutritional value, taxonomy, and botany of summer vegetable crops that grow in various places.
2. Students will study various vegetable post-harvesting methods and plant protection strategies.
3. Providing information on the summer crop seed production.

**Course Outcomes:**

1. To impart knowledge to students about the botany, taxonomy and nutritional value of summer vegetable crops growing in different regions.
2. Students will learn about different plant protection measures and post harvesting techniques in vegetables.
3. Providing knowledge of seed production of summer season crops.

**Mapping**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2											
CO2				2								
CO3			3									

**UNIT-I (7 Hours)**

Introduction, nutritional value, origin, botany and taxonomy, important countries and states growing vegetables along with area, climate and soil requirements

**UNIT-II (8 Hours)**

Commercial varieties/hybrids evolved by private and public sector, sowing/ transplanting time, seed rate, seed treatment, nutritional and irrigation requirements

**UNIT-III (8 Hours)**

Chemical weed control, mulching, physiological disorders, harvesting techniques, postharvest management, plant protection measures, Poly-house, net- house and low tunnel technology for off-season production of summer vegetables

**UNIT-IV (7 Hours)**

Seed production of warm season vegetable crops i.e. solanaceous crops, okra, cucurbitaceous crops, cowpea, sweet potato, cluster beans, amaranth, basella, kang-kong, tapioca.

**Recommended Text Books / Reference Books:**

- Choudhary BR & Dhaka RS. 2000. Vegetable Crops: Production Technology. Vol. II. Kalyani. Gopalakrishanan TR. 2007. Vegetable Crops. New India Publ. Agency.
- Hazra P & Som MG. (Eds.). 1999. Technology for Vegetable Production and Improvement. Naya Prokash.
- Kaloo G & Singh K (Ed.). 2000. Emerging Scenario in Vegetable Research and Development. Research Periodicals & Book Publ. House.
- Nayer NM & More TA 1998. Cucurbits. Oxford & IBH Publ. Palaniswamy & Peter KV. 2007. Tuber Crops. New India Publ. Agency.

**MRSPTU M.SC. (HORTICULTURE) VEGETABLE SCIENCE  
SYLLABUS 2022 BATCH ONWARDS**

**BREEDING OF SELF POLLINATED AND VEGETATIVELY PROPAGATED  
VEGETABLE CROPS**

**Subject Code: MHRTS2-103**

**L T P C**

**Duration: 30(Hrs.)**

2 0 0 2

**Course Objectives:**

1. Students will study the various vegetable crop breeding techniques.
2. To inform students on the various aspects that affect the growth of vegetable crops.
3. The use of biotechnology and its application in plant breeding will be taught to the students.

**Course Outcomes:**

1. Students will learn about the different breeding methods in vegetable crops.
2. To provide knowledge about the different factors effecting growth of vegetable crops.
3. Students will learn about the use of biotechnology and their use in plant breeding.

**Mapping**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				1								
CO2			2									
CO3					2							

**UNIT-I (7 Hours)**

History of vegetable breeding. Origin, botany, taxonomy, cytogenetic, genetics, breeding objectives, breeding methods (introduction, selection, hybridization, mutation)

**UNIT-II (8 Hours)**

Resistance breeding for biotic and abiotic stress, quality improvement in self-pollinated crops viz. tomato, brinjal, cowpea, pea, beans, okra, salad crops and asexually propagated crops like potato, sweet potato, colocasia and tapioca.

**UNIT-III (7 Hours)**

Molecular marker, marker assisted breeding and QTLs, biotechnology and their use in breeding in self pollinated and vegetatively propagated vegetable crops.

**UNIT-IV (8 Hours)**

Issue of patenting, PPV& FRA. Concept of ideotypes. Present status of varietal/hybrid development in India. New approaches in breeding of self pollinated vegetables.

**Recommended Text Books / Reference Books:**

1. Chopra GL. 1968. Angiosperms - Systematics and Life Cycle. S. Nagin37 Dutta AC. 1986. A Class Book of Botany. Oxford Univ. Press. Pandey BP. 1999. Taxonomy of Angiosperm.
2. S. Chand & Co. Peter KV & Pradeepkumar T. 2008. Genetics and Breeding of Vegetables. (Revised), ICAR. Soule J. 1985. Glossary for Horticultural Crops. John Wiley & Sons.
3. Srivastava U, Mahajan RK, Gangopadyay KK, Singh M & Dhillon BS. 2001. Minimal Descriptors of Agri Horticultural Crops. Part-II: Vegetable Crops. NBPGR, New Delhi. Vasistha. 1998. Taxonomy of Angiosperm. Kalyani.
4. Vincent ER & Yamaguchi M. 1997. World Vegetables. 2nd Ed. Chapman & Hall

**MRSPTU M.SC. (HORTICULTURE) VEGETABLE SCIENCE  
SYLLABUS 2022 BATCH ONWARDS**

**TECHNICAL WRITING AND COMMUNICATION SKILLS, LIBRARY AND  
INFORMATION SERVICES**

**Subject Code: MHRTS2-104**

**L T P C**

**Duration: 30 (Hrs.)**

2 0 0 2

**Course Objectives:**

1. Skill in written and vocal communication.
2. The competence in English.
3. The ability to use the English language well through word power

**Course Outcomes :**

1. Competency in communication both written and oral
2. The ability to speak English well.
3. Word power to effectively use the English language

**Mapping**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1										3		
CO2									2			
CO3										2		

**UNIT-I (7 Hours)**

Technical Writing-Variety forms of technical writing-theses, technical papers, reviews, electronic communication etc; qualities of technical writing

**UNIT-II (8 Hours)**

Parts of research communications- titlepage, content page, authorship, preface, introduction, review of literature, materials and methods, experimental results, documentation; photographs and drawings with suitable captions; pagination, citations; writing of abstracts; précis; synopsis

**UNIT-III (8 Hours)**

Editing and proof reading. Communication Skills-defining communication; types of communication- verbal and non-verbal; assertive communication; using language for effective communication;

**UNIT-IV (7 Hours)**

Techniques of dyadic communication- message pacing and message chunking, self-disclosure, mirroring, expressing conversational intent; paraphrasing; vocabulary building- word roots, prefixes, Greek and Latin roots.

**Recommended Text Books / Reference Books:**

1. Raman M and Sharma S (2015) *Technical Communication Principles and Practice. Oxford University Press, 3<sup>rd</sup> edition.*
2. Farhathullah T M (2017) *Communication Skill for Technical Students. Sangam Books Ltd.*



**MRSPTU M.SC. (HORTICULTURE) VEGETABLE SCIENCE  
SYLLABUS 2022 BATCH ONWARDS**

**INTELLECTUAL PROPERTY MANAGEMENT, BIODIVERSITY AND BIOSAFETY**

**Subject Code: MHRTS2-105**

**L T P C**

**Duration: 30(Hrs.)**

2 0 0 2

**Course Objectives:**

1. Students will study the background, principles, and varieties of international treaties and conventions for the protection of intellectual property.
2. To educate people on the importance that intellectual property plays in trade, commerce, and growth.
3. The many ecosystems and their sustainable applications will be taught to students.

**Course Outcomes:**

1. Students will learn about the history, concepts and types, international treaties and conventions for protection of IP'S.
2. To provide knowledge about the role of intellectual property in growth, development, trade and commerce.
3. Students will learn about the different ecosystems and their sustainable uses.

**Mapping**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2											
CO2												1
CO3							2					

**UNIT-I (8 Hours)**

Introduction to Intellectual Property: history, concepts and types. International treaties and conventions for protection of IP'S. Role of intellectual property in growth, development, trade and commerce; Indian legislations for the protection of various types of Intellectual Property with a special reference to history and evolution of the concepts of geographical indicators, variety protection and patents.

**UNIT-II (8 Hours)**

R & D expenditure visà-vis patents. PPVFRA: Process for protection of plant varieties, issues related to compliance sand infringements. GI: Process for protection of goods, community involvement and benefit sharing. Patents: Search, process of filing patents, infringement and compliances. Biodiversity: Definition, importance, historical and geographical causes for diversity. Species and population biodiversity,

**UNIT-III (7 Hours)**

Maintenance of ecological biodiversity. Biodiversity hot spots in India, Collection, conservation, documentation and characterization of biodiversity, development and maintenance of live repositories, community gene banks. Convention on biological diversity. National biodiversity protection initiatives; sustainable use of bio-diversity, benefit sharing, Bio-safety guidelines for the development and protection of genetically modified organisms

**UNIT-IV (7 Hours)**

Cartagena Protocol of Bio-safety, its objective, salient features, risk assessment and risk management for GMO's, Bio-safety guidelines, rules and regulations and regulatory frame work for GMO in India; institutional arrangements at national level, procedure for direct use of GMO's

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in India. Licensing of technologies, Material transfer agreements, Research collaboration agreement, License Agreement.

**Recommended Text Books / Reference Books:**

1. Sibi G (2021) Intellectual Property Rights, Bioethics, Biosafety and Entrepreneurship in Biotechnology. *Dreamtech Press*.
2. Goel D and Parashar S (2013) IPR Biosafety and Bioethics.

**PRODUCTION TECHNOLOGY OF WINTER SEASON VEGETABLE CROPS LAB**

**Subject Code: MHRTS2-106**

**L T P C**

**Duration: 30 (Hrs.)**

0 0 2 1

**Course Objectives:**

1. Students will be able to identify various deficiencies in vegetable crops.
2. To spread awareness about weed management techniques for vegetable crops.
3. After analysis, the student will be able to assess the quality indicators of vegetable harvests.

**Course Outcomes:**

1. Students will able to recognise different deficiency symptoms in vegetable crops.
2. To impart knowledge about the weed control methods in vegetable crops.
3. Student will able to evaluate the quality parameters of vegetable crops after analysis.

**Mapping**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2										
CO2					2							
CO3				2								

**PRACTICALS**

1. Study of nutrient deficiency symptoms.
2. Experiments on improved water use efficiency through mulching and different irrigation methods.
3. Different methods of weed control and herbicide sprays.
4. Preparation of cropping scheme for commercial farms.
5. Quality evaluation for carotene, protein and ascorbic acid.
6. Visit to an established vegetable farm in the region.

**MRSPTU M.SC. (HORTICULTURE) VEGETABLE SCIENCE  
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**PRODUCTION TECHNOLOGY OF SUMMER SEASON VEGETABLE CROPS LAB**

**Subject Code: MHRTS2-107**

**L T P C**

**Duration: 30(Hrs.)**

0 0 2 1

**Course Objectives:**

1. The function of minerals in crops and plant growth regulators will be taught to students.
2. To spread knowledge about fertigation and other irrigation techniques.

**Course Outcomes:**

1. Students will learn about the plant growth regulators and the role of minerals in crops.
2. Imparting knowledge about other cultural practises, such as how to raise vegetables in the off-season
3. To provide knowledge about the different irrigation practices including fertigation.
4. To impart knowledge how to grow vegetables during off seasons and other different cultural operations.

**Mapping**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						2						
CO2			3									
CO3					2							

**PRACTICALS**

1. Experiments to demonstrate the role of mineral elements.
2. Fertigation.
3. Chemical weed control.
4. Hybrid seed production of summer vegetables.
5. Use of growth regulators.
6. Seed extraction techniques.
7. Identification of pests and diseases and their control.
8. Forcing techniques for raising summer vegetables.
9. Pruning, grafting and staking.
10. Quality determination for sugar, capsaicin and minerals using atomic absorption

**MRSPTU M.SC. (HORTICULTURE) VEGETABLE SCIENCE  
SYLLABUS 2022 BATCH ONWARDS**

**BREEDING OF SELF POLLINATED AND VEGETATIVELY PROPAGATED  
VEGETABLE CROPS LAB**

**Subject Code: MHRTS2-108**

**L T P C**

**Duration: 30 (Hrs.)**

0 0 2 1

**Course Objectives:**

1. To impart information on how to choose planting material for breeding reasons.
2. To investigate various flowering induction techniques.
3. With the use of various breeding techniques, students will be able to identify the beneficial features in vegetable crops.

**Course Outcomes:**

1. To provide knowledge about the selection of planting material for breeding purposes.
2. To study about the different methods of flowering inducing.
3. Students will able to recognise the useful traits in vegetable crops using different breeding approaches.

**Mapping**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				2								
CO2				2								
CO3					1							

**PRACTICALS**

1. Selection of desirable plants from breeding population.
2. Observations and analysis of various qualitative and quantitative traits in germplasm, hybrids and segregating generations.
3. Induction of flowering.
4. Selfing and crossing techniques in vegetable crops.
5. Hybrid seed production of vegetable crops in bulk.
6. Screening techniques for insect-pests, disease and environmental stress resistance in above mentioned crops.
7. Demonstration of sib-mating and mixed population.
8. Molecular marker techniques to identify useful traits in the vegetable crops and special breeding techniques.

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**TECHNICAL WRITING AND COMMUNICATION SKILLS, LIBRARY AND  
INFORMATION SERVICES LAB**

**Subject Code: MHRTS2-109**

**L T P C**

**Duration: 30 (Hrs.)**

0 0 2 1

**Course Objectives:**

1. Skill in written and vocal communication.
2. Having good English language skills.
3. Word strength to use the English language well.

**Course Outcomes:**

1. Competency in communication both written and oral
2. The ability to speak English well.
3. Word power to effectively use the English language.

**Mapping**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1										3		
CO2									2			
CO3										2		

**PRACTICALS**

1. Editing and Proof-reading technical articles using language tools for effective writing
2. Listening to audio-video conversations aimed at testing the comprehension of the students
3. Oral presentations on a given topic related to agriculture
4. Evaluation of body language and communication skills based on group discussions and interviews
5. Role plays and pronunciation exercises using eye contact and visual clues for effective listening skills
6. Word stress application and voice modulation
7. Soft skills; rhetoric skills; self-assessment exercises.
8. Introduction to Library and its services; Five laws of library science; type of documents
9. Classification and cataloguing
10. Organization of documents
11. Sources of information-primary, secondary and tertiary
12. Current awareness and SDI services
13. Tracing information from reference sources
14. Library survey
15. Preparation of bibliography
16. Use of Online Public Access Catalogue
17. Use of CD-ROM databases and other computerized library services, CeRA, J-Gate
18. Use of Internet including search engines and its resources; e-resources and access methods.