



**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED**  
**HORTICULTURE – CURRICULUM**  
**B.Sc. General (Semester Pattern)**

**B. Sc. THIRD YEAR**

**With Effect from June – 2014-2015**



**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED**  
**HORTICULTURE– CURRICULUM**  
**B.Sc. General (Semester Pattern)**

**CURRICULUM DESIGNING COMMITTEE**

<b>Sr. No.</b>	<b>Name &amp; Address</b>	<b>Designation</b>
1.	<b>Dr. S. S. Bodke</b> Associate professor & Head Department of Botany & Horticulture, Yeshwant Mahavidyalaya, Nanded	Chairman
2.	<b>Mrs. A. K. Gore</b> Assistant Professor, Department of Botany & Horticulture, Yeshwant Mahavidyalaya, Nanded	Member
3.	<b>Mr. S. A. Patil</b> Assistant Professor, Department of Botany & Horticulture, Yeshwant Mahavidyalaya, Nanded	Member
4.	<b>Dr. S. S. Kadam</b> Associate Professor, Department of Botany, ACS College, Shankarnagar Tq.Biloli Dist. Nanded	Member
5.	<b>Dr. S. M. Dalvi</b> Assistant Professor, Department of Botany, SGBS Mahavidyalaya, Purna Dist. Parbhani	Member
6.	<b>Dr. S. L. Shinde</b> Assistant Professor, Department of Botany & Horticulture, Yeshwant Mahavidyalaya, Nanded	Member

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**HORTICULTURE– CURRICULUM**

**B.Sc. General (Semester Pattern)**

**INTRODUCTION**

Revising and updating of the curriculum is the continuous process to provide an updated education to the students at large. Up till now there was wide diversity in the curriculum of different Indian Universities which inhibited mobility of students in other universities or states. To ensure and have uniform curriculum at UG and PG levels, curriculum of different Indian Universities and the UGC model curriculum are referred to serve as a base in updating the same.

For developing the final draft of curriculum, the BOS in Botany took into account total number of teaching days available in a year and the guidelines given by the faculty of science of the S.R.T.M.U Nanded. The BOS in Botany held a couple of meetings in which there were thorough and critical discussions.

S.R.T.M.University, Nanded is having B.Sc. (General) Horticulture course. The course content has been designed on semester pattern.

The course content of each theory paper is divided into units and subunits by giving appropriate titles and subtitles. For each unit, total number of periods required and weightage of maximum marks is mentioned. At the end a list of selected reading material is provided. A list of practical exercises to be completed in the academic year is also given.

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**HORTICULTURE– CURRICULUM**

**B.Sc. General (Semester Pattern)**

**OBJECTIVES**

1. To provide an updated education to the students at large and to provide mobility to students from one university or state to other
2. To update curriculum by introducing recent advances in the subject and enable the students to face NET, SET, UPSC and other competitive examinations successfully.
3. To create awareness among the students about the Horticulture and train them in the subject.
4. To improve the quality of laboratory and field work, for which study tours and excursions have been made compulsory so that the students can become familiar with the horticultural crops of that area.
5. To prepare such a dynamic curriculum by incorporating innovative concepts and a multidisciplinary approach which attract and develop interest among the students for selecting horticulture science as their career

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**HORTICULTURE– CURRICULUM**

**B.Sc. General (Semester Pattern)**

**B. Sc. HORTICULTURE**

**B. Sc. Horticulture Curriculum - an outline**

Class & Semester	Paper No. & Title	Period /practical	Marks		
			University Examination	Internal Exam	Total
B.Sc. I Year Semester-I	<b>Theory Paper-I:</b> Fundamentals of Horticulture	45	40	10	50
	<b>Theory Paper-II:</b> Propagation and Nursery Management	45	40	10	50
B.Sc. I Year Semester-II	<b>Theory Paper-III:</b> Production Technology of Tropical And Sub-Tropical Fruit Crops	45	40	10	50
	<b>Theory Paper-IV:</b> Production Technology of Arid, Minor and Plantation Fruit Crops	45	40	10	50
B.Sc. I Year Annual pattern	<b>Practical Paper-V:</b> Practical based on theory papers of semester-I&II	24	100	-	100
B.Sc. II Year Semester-III	<b>Theory Paper-VI:</b> Production Technology of Vegetable Crops-I	45	40	10	50
	<b>Theory Paper-VII:</b> Production Technology of Vegetable Crops-II	45	40	10	50
B.Sc. II Year Semester-IV	<b>Theory Paper-VIII:</b> Ornamental and Landscape Gardening	45	40	10	50
	<b>Theory Paper-IX:</b> Commercial Floriculture	45	40	10	50
B.Sc. II Year Annual pattern	<b>Practical Paper-X:</b> Based on Theory Paper-VI&VII of semester-III	24	50	-	50
B.Sc. II Year Annual pattern	<b>Practical Paper-XI:</b> Based on Theory Paper-VIII&IX of semester-IV	24	50	-	50
B.Sc. III Year Semester-V	<b>Theory Paper-XII:</b> Production Technology of Spice and Condiment crops	45	40	10	50
	<b>Theory Paper-XIII:</b> Production Technology of Medicinal and Aromatic plants	45	40	10	50
B.Sc. III Year Semester-VI	<b>Theory Paper-XIV:</b> Post Harvest and Handling of Horticultural crops	45	40	10	50
	<b>Theory Paper-XV:</b> Processing and Preservation Technology	45	40	10	50
B.Sc. III Year Annual pattern	<b>Practical Paper-XVI:</b> Based on Theory Paper-XII&XIII of semester-V	24	50	-	50
B.Sc. III Year Annual pattern	<b>Practical Paper-XVII:</b> Based on Theory Paper-XIV&XV of semester-VI	24	50	-	50

**Workload:** 1. **Theory:** Per paper per week three periods

2. **Practical:** Per batch per week one practical of three periods





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**HORTICULTURE– CURRICULUM**

**B.Sc. General (Semester Pattern)**

**B. Sc. THIRD YEAR**

**HORTICULTURE**

Semester – V & VI

**B.Sc. III Year, Horticulture Curriculum - an outline**

Class & Semester	Paper No. & Title	Period / practical	Marks		
			University Examination	Internal Exam	Total
B.Sc. III Year Semester-V	<b>Theory Paper – XII:</b> Production Technology of Spices and Condiments Crops	45	40	10	50
	<b>Theory Paper – XIII:</b> Production Technology of Medicinal and Aromatic Plants	45	40	10	50
B.Sc. III Year Semester-VI	<b>Theory Paper – XIV:</b> Post Harvest and Handling of Horticultural Crops	45	40	10	50
	<b>Theory Paper-XV:</b> Processing and Preservation Technology	45	40	10	50
B.Sc. III Year Annual pattern	<b>Practical Paper – XVI:</b> Practical Based on Theory Papers-XII & XIII of Semester-V	24	50	-	50
B.Sc. III Year Annual pattern	<b>Practical Paper – XVII:</b> Practical Based on Theory Papers-XIV & XV of Semester-VI	24	50	-	50

**Workload:** 1. **Theory:** Per paper per week three periods  
2. **Practical:** Per batch per week one practical of three periods

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**HORTICULTURE– CURRICULUM**  
B.Sc. General (Semester Pattern)

**B. Sc. THIRD YEAR**

Semester – V

**Theory Paper – XII: Production Technology of Spices and Condiments Crops**

***Periods – 45***

***Maximum Marks – 50***

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**Unit-I: Spices and Condiments-I (12 periods)**

Introduction; Geographical distribution of spices and condiments, area of production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, after care, manures and fertilizers, irrigation, processing , harvesting, grading, packing and marketing of Turmeric, Coriander and Cardamom

**Unit-II: Spices and Condiments-II (10 periods)**

Geographical distribution of spices and condiments, area of production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, after care, manures and fertilizers, irrigation, processing , harvesting, grading, packing and marketing of Ginger, Fenugreek, Clove and Cumin

**Unit-III: Spices and Condiments-III (13 periods)**

Geographical distribution of spices and condiments, area of production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, after care, manures and fertilizers, irrigation, processing , harvesting, grading, packing and marketing of Chilli, Mustard, Curry leaf and Black pepper

**Unit-IV: Spices and Condiments-IV (10 periods)**

Geographical distribution of spices and condiments, area of production, history, origin, distribution, varieties, soil and climatic requirements, propagation and planting, after care, manures and fertilizers, irrigation, processing , harvesting, grading, packing and marketing of Garlic, onion, Saffron and Nutmeg

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**HORTICULTURE – CURRICULUM**

**B.Sc. General (Semester Pattern)**

**B. Sc. THIRD YEAR**

Semester – V

**Theory Paper – XIII: Production Technology of Medicinal and Aromatic Plants**

***Periods – 45***

***Maximum Marks – 50***

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**Unit-I: Medicinal and Aromatic Plants-I (13 periods)**

Introduction to medicinal and aromatic plants; History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Dioscoria, Rauwolfia and Opium

**Unit-II: Medicinal and Aromatic Plants-II (12 periods)**

Introduction to medicinal and aromatic plants; History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Periwinkle, Aloe, Guggul and Plantago

**Unit-III: Medicinal and Aromatic Plants-III (10 periods)**

Introduction to medicinal and aromatic plants; History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Coleus, Stevia, Senna and Solanum

**Unit-IV: Medicinal and Aromatic Plants-IV (10 periods)**

Introduction to medicinal and aromatic plants; History, origin, distribution, propagation, cultural practices, nutrition and water management, harvesting, processing and marketing of Sandalwood, Mehendi, Mint and Lemon grass

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**HORTICULTURE – CURRICULUM**

**B.Sc. General (Semester Pattern)**

**B. Sc. THIRD YEAR**

Semester – VI

**Theory Paper – XIV: Post Harvest and Handling of Horticultural Crops**

***Periods – 45***

***Maximum Marks – 50***

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**Unit-I: Post Harvest and Handling of Horticultural Crops (12 periods)**

Importance of Post Harvest Handling; Maturity and maturity indices of Horticultural crops; harvesting methods of Horticultural crops

**Unit-II: Harvesting Factors of Horticultural Crops (13 periods)**

Factors responsible for Maturity, Ripening and Deterioration of Horticultural crops; **Pre harvest factors**- Selection of varieties, Cultural operations, Pre harvest treatments, Maturity and Harvesting; **Post harvest factors**-Curing, De greening, Pre cooling, Washing and drying, Storing and grading, Disinfestations, Post harvest treatments and Waxing

**Unit- III: Ripening of Horticultural Crops (10 periods)**

Methods used for hastening and delaying ripening; Chemical that hastens ripening; Chemicals that delay in ripening; Respiration and Transpiration in relation to Harvesting, Packing, Transportation and Storage

**Unit-IV: Bio deterioration of Horticultural Crops (10 periods)**

Nature and causes of deterioration; Primary causes of losses- Mechanical losses, Physio – biochemical losses, Microbial losses and Physical losses; Secondary causes of losses- Methods of pre Cooling, Grading, Packaging, Storage and Transport of Horticultural crops

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B. Sc. THIRD YEAR  
Semester – VI

Theory Paper – XV: Processing and Preservation Technology

***Periods – 45***

***Maximum Marks – 50***

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**Unit-I: General account (12 periods)**

History of Food Preservation; Importance and Scope of Fruit and Vegetable Preservation; Selection of Site for Fruits and Vegetables Preservation Unit; Principles and Methods of Preservation

**Unit-II: Dehydration and Canning (10 periods)**

Dehydration of Fruits and Vegetables; Canning of vegetables; Food preservatives; Colours and flavours used in food Industry

**Unit-III: Preparation of fruit products (13 periods)**

Preparation of Mango pulp, Papaya jam, Grape juice, Apple jelly, Citrus squash & marmalade

**Unit-IV: Preparation of vegetable products (10 periods)**

Tomato juice, Tomato sauce, Garlic and Ginger paste, Chilli pickle and Mixed Vegetable Pickle

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Annual Pattern

**Practical Paper – XVI: Practical Based on Theory Papers-XII & XIII of Semester-V**

***Practical- 24***

***Maximum Marks – 50***

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**Practical Exercises:**

**Practical no. 1-4:** Study of Spices and Condiments

**Practical no. 5-7:** Study of Medicinal plants

**Practical no. 8-9:** Study of Aromatic plants

**Practical no. 10-12:** After care in Spices and Condiments

**Practical no. 13-15:** Harvesting and Curing of spices and condiments

**Practical no. 16-18:** Extraction of Essential Oils from Aromatic plants

**Practical no. 19-20:** Micro Chemical tests of ingredients from Medicinal plants

**Practical no. 21-22:** Two local Horticultural excursions. The excursion report is necessary for practical examination for evaluation, the report shall carry marks.

**Practical no. 23-24:** One long horticultural excursion. The excursion report is necessary for Practical Examination for Evaluation, the report shall carry marks.

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B.Sc. General (Semester Pattern)

**Skeleton Question Paper**  
**B. Sc. THIRD YEAR**  
Annual Pattern

**Practical Paper – XVI: Practical Based on Theory Papers-XII & XIII of Semester-V**

**Time: Three hours**

**Maximum Marks: 50**

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- Note: -**
- (i) *Attempt all questions*
  - (ii) *Show your preparation to the examiner*
  - (iii) *Draw neat and well labeled diagrams wherever necessary*
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|-------------|---|-----------|
| <b>Q1.</b>  | Identify and describe the given spices and condiments crops samples of Specimen- <b>A</b> and <b>B</b>      | <b>10</b> |
| <b>Q.2.</b> | Identify and describe the given Medicinal and Aromatic plant samples of the Specimen- <b>C</b> and <b>D</b> | <b>10</b> |
| <b>Q.3.</b> | Detect the essential oil /micro-chemical tests of the given Specimen- <b>E</b>                              | <b>10</b> |
| <b>Q.4.</b> | a. Record book  | <b>10</b> |
|             | b. Excursion Report & Submissions   | <b>05</b> |
|             | c. Viva-voce  | <b>05</b> |

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Annual Pattern

Practical Paper – XVII: Practical Based on Theory Papers-XIV & XV of Semester-VI

**Practical- 24**

**Maximum Marks – 50**

**Practical Exercises:**

**Practical no. 1 & 2:** Maturity and Harvesting Indices of Important Fruit Crops

**Practical no. 3 & 4:** Maturity and Harvesting Indices of Important Vegetable crops

**Practical no. 5:** Temperature and Relative Humidity for Storage of Fruits

**Practical no. 6:** Temperature and Relative Humidity for Storage of Vegetables

**Practical no. 7:** Changes in Total Soluble Solids of Fruits during Storage

**Practical no. 8:** Changes in Acidity of Fruits during Storage

**Practical no. 9:** Changes in Total Sugars of Fruits during Storage

**Practical no. 10:** Changes in Reducing and Non Reducing Sugars of Fruits during Storage

**Practical no. 11:** Preparation of Mango pulp

**Practical no. 12:** Preparation of Papaya jam

**Practical no. 13:** Preparation of Grape juice

**Practical no. 14:** Preparation of Apple & Wood Apple jelly

**Practical no. 15:** Preparation of Citrus Squash

**Practical no. 16:** Preparation of Citrus Marmalade

**Practical no. 17:** Preparation of Tomato juice

**Practical no. 18:** Preparation of Tomato sauce

**Practical no. 19:** Preparation of Garlic and Ginger paste

**Practical no. 20:** Preparation of Chilli pickle

**Practical no. 21:** Preparation of Mixed Vegetable pickle

**Practical no. 22-24:** Several local and at least a long Horticultural excursion for fruit and vegetable processing units. The excursion report is necessary for practical examination for evaluation, the report shall carry marks.

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**Skeleton Question Paper**  
**B. Sc. THIRD YEAR**  
Annual Pattern

**Practical Paper – XVII: Practical Based on Theory Papers-XIV & XV of Semester-VI**

**Time: Three hours**

**Maximum Marks: 50**

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- Note: -**
- (i) Attempt all questions
  - (ii) Show your preparation to the examiner
  - (iii) Draw neat and well labeled diagrams wherever necessary
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- Q1.** Estimate the Total Soluble Solids (TSS)/Acidity/Reducing Sugars/Total Sugars of given fruit sample of the Specimen- A **10**
- Q.2.** Prepare the given fruit product of the given sample of Specimen-B **10**
- Q.3.** Prepare the given vegetable product of the given sample of Specimen-C **10**
- Q.4.**
- a. Record book **10**
  - b. Excursion Report & Submissions **05**
  - c. Viva-voce **05**

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**B. Sc. THIRD YEAR**

**Selected Readings:**

1. K. G. Shanmugavelu, V. N. Madhavrao: Spices and Condiment crops, Nadra Popular Depot, Sterlin road, Nungambakkam
2. K.M. Pillai: Textbook of Plantation Crops, Vini Education Books Pub. House, Ansari Road, New Delhi.
3. J. S. Pruthi Spices and Condiments, National Books Trust, New Delhi
4. V. B. Singh and Kirti Singh: Spices, New Age International (P) Limited Publishers
6. K. L. Chadha: Handbook of Horticulture ICAR
7. S. B. Gurav Aromatic, Spice and Medicinal Plants Snehvardhan Publishing House, Pune
  
1. Atal E. K., and Kaput, B. M.: Cultivation and Industries of Medicinal and Aromatic Plants (1989) Vol. I and II, CRRL, CSIR, Jammu and Kashmir
2. K. L. Chadha and Rajendra Gupta: Advances in Horticulture (1995) Vol. II
3. Kirtikar *et al.* : Indian Medicinal Plants (1975) Vol I & IV
4. S. K. Jain : Medicinal Plants
5. Kumar, N.: Introduction to Spices, Plantation crops, Medicinal and Aromatic Plants, Scientific Book Suppliers, 2726, Mrinagar, Delhi 110035
6. K. L. Chadha: Handbook of Horticulture ICAR
7. S. B. Gurav: Aromatic, Spice and Medicinal Plants Snehvardhan Publishing House, Pune
1. Pantastico E.R.B (1975): Post harvest Physiology, Handling, Industries of Tropical and Subtropical Fruits and Vegetables The AVI Publishing Co. Inc. Westportt, Connecticut
2. Salunkhe D. K. & B. B. Desai (1984): Post Harvest Biotechnology of Vegetables Vol. I & II CRO Press, Inc. Boc Raton, Florida.
3. Weichann, J. (1987): Post harvest Physiology, of Vegetables Mercel Dekker, Inc. New York
4. Wills, R. B.H: Postharvest An Introduction to Physiology and Handling of Fruits and Vegetables  
International Book and Periodicals supply Selvice Delhi 110 034
5. Srivastava and Kumar Preservation of Fruits, and Vegetables
6. K. L. Chadha Handbook of Horticulture, ICAR Selected Readings
1. Giridharilal, G.S., Sidhappa and G.L. Tondan (1986): Fruit and Vegetable Preservation ICAR
2. Shrivastava R.P. (1982) Preservation of Fruit and Vegetable Products, Bishan Singh and, Mahendra Singh Dehradun
3. Cruess, W.V. (1958): Commercial Fruit and Vegetable Products Mac. Graw Hill. Book Co. New York
4. Morris, J.N. (1951): Principles of Fruit Preservation Chpman and hall co., London
5. Jones Osman (1949) Canning Practices and Control Chpman and hall co., London
6. FAO Fruit and Vegetable Processing International Book Distributing Co. Chamma studio building, 2 nd floor, Charbagh, Lucknow -226 004
7. Manoranjandas Kalia and Sangeeta Sood: Preservation of Fruit and Vegetables
8. K. L. Chadha: Handbook of Horticulture ICAR