



ANNAMALAI UNIVERSITY

FACULTY OF AGRICULTURE

DIPLOMA IN HORTICULTURE

(ON-CAMPUS) (2017-2018)

REGULATIONS AND SYLLABUS

REGULATIONS

1. Title and Scope

- 1.1. These academic Regulations shall be called “Annamalai University Faculty of Agriculture, Diploma in Horticulture (Dip. Hort.) regulations for obtaining Diploma in Horticulture in the Faculty of Agriculture.
- 1.2. The regulations provided herein shall apply to the students admitted from the academic year 2017-18 onwards.

2. Definitions

- 2.1. University: University means Annamalai University, Annamalainagar, Tamilnadu.
- 2.2. State Government: State Government means the Government of Tamilnadu.
- 2.3. Academic year: An academic year is a period during which a cycle of study is completed. It shall commence on or after 1st July of each year. There shall be two semesters in an academic year.
- 2.4. Semester: A semester shall consist of 105 working days inclusive of the mid-semester and practical examinations.
- 2.5. Curriculum: It is a series of courses offered to provide learning opportunities to meet the requirements for a degree.
- 2.6. Course: A course is a unit of instructions, series of classes and work experience extending over a semester. It has a specific Prefix, code number, title and credits. Each course is denoted by specific code number, which has specific meaning.
The first three alphabets stand for the department offering the course. First digit is related to the year; second digit is related to the semester and the third digit is related to course number in a particular semester i.e. “SAC-114 “Soils and fertility management for horticultural crops”. “SAC” stands for the Department of Soil Science and Agricultural chemistry; the first digit (1) stands for the year; second digit (1) stands for the semester and the third digit (2) stands for the serial number of course in a particular semester.
- 2.7. Credit: It is a measure of quantity of work done in a course. One credit represents one contact hour for theory or two contact hours of laboratory or field work per week . For example, a 1+1 course (2 credits) means 1 hour theory and 2 hours practical per week.
- 2.8. Credit load: It is the number of credits a student undergoes in a semester.

- 2.9. Grade Point: “Grade Point” means the total marks in percentage divided by 10 and shall be expressed on 10-point scale upto second decimal place.
- 2.10. Credit point: A credit point is a product of grade point obtained by a student and number of credits in a course.
- 2.11. Grade Point Average (GPA): It is a measure of performance of a student in all the courses taken during a semester. The GPA is computed by dividing the total credit points earned by a student in a semester by the total number of credits taken during that semester.
- 2.12. Overall Grade Point Average (OGPA). It is a measure of the cumulative performance of a student on completion of the second and subsequent semesters of the diploma programme. It is computed by dividing the total credit points earned by a student up to the end of a particular semester by the total number of credits. It shall be expressed on 10 point scale up to second decimal place
- 2.13. The OGPA shall be rounded off to second digit of decimal point on the basis of third digit. If third digit of decimal point is 5 or more than 5, then second digit will be increased by one. If, however, it is less than 5, it will be ignored. This will be done at the end of each semester while calculating the OGPA.
- 2.14. Calculation of OGPA

To arrive at the “Overall Grade Point Average (OGPA)” at the end of a semester, the grade point of each course is multiplied by the credit hours of the course to obtain the credit points. Then, the sum of the credit points secured by the student in all the courses taken till the end of that semester is divided by the total number of credit hours of the courses, provided that the credit hours and credit points of courses which are repeated are not counted more than once for this purpose.

For Example

- | | |
|--|-------------------------|
| i. Total credit hours till the end of last semester | : 18 |
| ii. Total credit points till the end of last semester | : 140.50 |
| iii. Total credit hours in the current semester | : 22 |
| iv. Total credit points obtained in the current semester | : 156 |
| v. Total credit hours including the current semester | : (18+22) = 40 |
| vi. Total credit points including the current semester: | 140.50 +156.00 = 296.50 |
| vii. Overall Grade Point Average | : (296.50/40) = 7.412 |
| viii. Corrected to two decimals | : 7.41 / 10.00 |

- 2.15. “Transcript Card” is a consolidated report of grades secured by the student in all the semesters, issued by the University.

3. Admission

- 3.1. Admission of the student to Diploma in Horticulture in the Faculty of Agriculture shall be on the basis of merit and in accordance with the policy and guidelines of the state government and the University. The minimum admission requirement shall be decided by university and issued from time to time. Decision of the University is final in deciding procedure of admission and finalization of number of seats. Reservation rules shall be made applicable as per norms of the state government.

3.2. Tuition fees and scholarships

The various fees payable by the students will be decided by the University from time to time.

In case of new admission, the fees for the semester are payable in advance failing which they will not be admitted.

In other cases, the fees are payable within seven working days from the commencement of the semester.

In the case of default, a fine as per the University rules will be collected.

The students who fail to pay the tuition fees within a month of commencement of the semester will not be allowed to attend the classes and their names will be struck off from the rolls. However, if the defaulting students pay the fees along with the fines in addition to a prescribed readmission fee, they will be permitted to attend the classes. The period for which his/her name is struck off from the rolls will be treated as absence for the purpose of calculating the minimum attendance requirements.

Students who are away on study tour, camp activities or other extracurricular activities organised by the University or the Faculty at the commencement of the semester may, however, pay their semester tuition fees and other fees within the third working day after they return from such programmes, without fine.

A student who has been granted scholarships by the Welfare Departments or by the Government of India or by the State Government will, however, be exempted from the levy of fines, provided the fees are paid on the next day after the scholarship amount is actually disbursed to him/her. The concession referred above will apply to those who have actually been granted scholarships and not to those who have only applied and are expecting sanction.

The candidate should obtain a Hall Ticket from the Controller of Examinations through the Dean after clearing all arrears including the hostel dues before the commencement of each semester final examination.

4. Advisory System

4.1. Dean shall nominate a co-coordinator from amongst the teaching faculty.

4.2. Student ward counselors will be nominated soon after the students' admission. The counselor shall be nominated from amongst the teaching faculty.

5. Curriculum and Programme of Study

5.1. The students admitted in the university shall be required to follow the curriculum as prescribed, revised by the Faculty and approved by the Academic Council from time to time.

6. Award of Diploma, Duration and Credit Requirements

6.1. A student is required to complete the duration and credit requirements for the award of diploma as decided by Academic Council from time to time.

Sl.No.	Diploma	Duration requirements (Semester)		Credit requirements
		Min.	Max	
1.	Diploma in Horticulture	4	8	65

7. Medium of Instruction

7.1. The medium of Instruction in Diploma in Horticulture shall be English.

8. Attendance Requirements

- 8.1 One hundred per cent attendance is expected from each student. A student who fails to secure 80 per cent of attendance prescribed for a course (subject) of study, separately in theory and practical shall not be permitted to appear for both theory and practical examinations in that course (subject) and shall be given 'E' (incomplete) and will be required to repeat the course (subject) when offered again.
- 8.2 For the first year first semester students, for calculating 80 per cent attendance, the number of working days will be calculated only from the date of joining of the student.
- 8.3 If any student is absent for field trips, the student may be marked absent for all the compensating classes on the day of the field trip in addition to the field trip courses.
- 8.4 The attendance for mid semester examination will be counted as a theory class.
- 8.5 Students abstaining from the classes by prior permission from the Dean, Faculty of Agriculture on Official University business, shall be given due consideration in computing attendance requirements.
- 8.6 However, condonation of attendance deficiency may be considered by the Vice-Chancellor only in case of genuine reasons including indoor hospitalization with evidence in the form of Hospitalization certificate and Discharge summary recommended by the Dean, Faculty of Agriculture. The Vice-Chancellor may decide whether or not a condonation fee is required, based on the reason for condonation.
- 8.7 The student belonging to a batch will attend classes and earn attendance in the particular batch only as per the time table. No student shall be permitted to attend along with another batch to gain attendance either in theory or in practical.

9. Examinations

Each course shall carry a maximum of 100 marks for the purpose of grading. The distribution of marks shall be as follows.

9.1. Course with both Theory and Practical	Marks
i. Mid Semester Examination	20
ii. Practical Examination (Written = 25, Record = 5, Specimen collection / Assignment = 5 and Viva-Voce = 5) (The question pattern in written part should be uniform in each department)	40
iii. Final Theory Examination	40
Total	100

9.2. Course with only Practical*	Marks
i. Mid Semester Examination	40
ii. Final Semester Examination	60
Total	100

9.3. Evaluation of Course Work

The results of the course shall be indicated by grade points ranging from 0 to 10.0. The minimum grade point to be secured for the successful completion of a course will be 6.00. Securing a grade point less than 6.00 in a course will be treated as 'RA' and the grade point will be 0 for calculating the GPA/OGPA. In case of course with theory and practical, minimum of 50 % mark separately in theory and practical with an aggregate of 60 per cent is essential. An OGPA of 6.50 shall be the minimum requirement for the award of diploma.

The following symbols shall be used in the grade sheets.

- E - Incomplete (due to attendance deficiency)
- AB - Absent
- RR - Re-registration
- RA - Re-appearance
- IE - Improvement Examination
- EE - Incomplete for reasons other than attendance

9.4. Evaluation pattern for courses with only practical

The evaluation pattern of courses with only practicals is grouped and mark distribution is furnished below.

A. PED 118 Physical Education (0+1)

The students will be evaluated for 100 marks. The course teacher will evaluate the performance and behavior of students in the classes and marks will be awarded at the end of the first semester as detailed below.

Particulars	Max marks
Attendance and Routine Activities	60
Behaviour	15
Participation in Tournaments	25
Total	100

B. ENG 128 / TAM 228

Particulars	Mid-semester Examination	Final Examination
Written Test	30	40
Continuous Evaluation	10	-
Assignment	-	5
Record	-	5
Viva Voce	-	10
Total	40	60

C. COM 115

Particulars	Mid-semester Examination	Final Examination
Written test	30	40
Continuous Evaluation	10	-
Assignment	-	5
Record	-	5
<i>Viva voce</i>	-	10
Total	40	60

D. Crop Production HOR 124 & HOR 213

Particulars	Mid-semester examination	Final examination
Field Evaluation	20	20
Written Examination	20	25
Record	-	5
Assignment	-	5
<i>Viva-Voce</i>	-	5
Total	40	60

E. Study Tour: HOR 222 (0+1)

The course HOR 222 Study tour is compulsory. The tour will be under taken during fourth semester. The duration of study tour shall not exceed 15 days. The tours will be arranged by the respective department of the study in consultation with the Dean, Faculty of Agriculture. The final examination will be conducted separately at the end of the semester by the University. The Marks for the tour are to be awarded as follows.

Particulars	Max Marks	Evaluation by
Attendance	20	Accompanying staff
Behaviour	20	
Final Examination		
Tour Diary	20	By the organising staff/Examiner
Tour record	30	
<i>Viva voce</i>	10	
Total	100	

F. AEN 117 and PAT 126

Particulars	Mid-semester examination	Final examination
Written test	40	40
Assignment	-	5
Record	-	5
<i>Viva voce</i>	-	10
Total	40	60

G. Practical Training in Hill Horticultural Crops (HOR 223)

Periodical evaluation of the above course will be done by the course teacher during different stages of work. Final evaluation of the above course will be done by the teacher incharge and another examiner. The final examination will be conducted by the University before the commencement of regular final semester examinations. The distribution of marks will be 40 for periodical evaluation and 60 for final examination.

Particulars	Max marks	Evaluation by
Observation Note book	20	By Teacher in-charge
Proficiency in skill learning	20	
Final examination		
Skills learned	20	By the Examiners
Record	20	
Viva voce	20	
Total	100	

10. Mid-semester Examination (MSE)

- 10.1. Writing the mid-semester examination is a pre-requisite for writing the final theory and practical examinations. If a student does not appear for MSE, he/she is not eligible to appear for the final examinations. Such candidate has to reappear for the MSE as and when the respective examinations are conducted only after getting permission from the Dean, Faculty of Agriculture on payment of fee prescribed by the University. MSE will be conducted by the Dean, Faculty of Agriculture. The answer scripts will be shown to the student after valuation, and returned to the course teacher. The Head of the Department/Division will be responsible to ensure the distribution of answer papers to the students.
- 10.2. The MSE marks will not be shown separately in the grade sheet but will be combined with the respective final theory and practical marks. MSE marks awarded in a course will be added to the supplementary examinations also.
- 10.3. The MSE marks will be furnished to the Dean, Faculty of Agriculture through Head of the Department within 10 days after the conduct of MSE. If the student is not satisfied with the award of the marks, he/she shall appeal to the Dean, within three working days after the announcement of marks. The appeal will be considered and the results reviewed by a cell consisting of the Dean and the Head of the Department /Division of Studies concerned. The decision of the Review Cell shall be final. If the Head of the Department himself is the course teacher, one senior member of the department concerned shall be nominated by the Dean.
- 10.4. The MSE of theory will be one hour duration
For courses with both theory and practical, 20 marks will be apportioned as shown below.

	Marks
i) Fill up the blanks @ ½ mark for 10 questions out of 12	5
ii) Definition @ 1 mark for 5 questions out of 7	5
iii) Short notes @ 2½ marks for 2 questions out of 3	5
iv) Essay type @ 5 marks for 1 question out of 2	5
Total	<u>20</u>

- 10.5. If the student is not able to write the MSE due to deputation by the University, he/she may be permitted to take up missing MSE. Such examination should be completed ordinarily within 15 working days after the respective MSE.
- 10.6. A student who fails to attend a mid-semester examination due to unavoidable circumstances shall be permitted with prior approval of the Dean to take up missing examination of the particular course, on payment of fee prescribed by the University. Such tests should be completed ordinarily within 15 working days after the respective MSE.

11. Final Examinations

- 11.1. The final theory and practical examinations will be of three hours duration each.
- 11.2. Theory examinations will be conducted after practical examinations.
- 11.3. The question papers for the final theory examinations will be set by the external examiners.

The 40 marks will be apportioned as shown below.

	Marks
i) Fill up the blanks @ $\frac{1}{2}$ mark for 10 questions out of 12	5
ii) Definition @ 1 mark for 5 questions out of 7	5
iii) Short notes @ $2\frac{1}{2}$ marks for 2 questions out of 3	5
iv) Essay type @ 5 marks for 5 questions (either or pattern from each Unit)	25
Total	<u>40</u>

- 11.4. Central valuation of answer books will be done by examiners on the advice of the Chairman, Board of Examiners.
- 11.5. Practical Examination
Practical examinations will be conducted separately towards the end of each semester. Proper maintenance and regular submission of practical records are required. Those who do not bring with them the certified practical records/specimen collection/assignments will not be allowed to appear for the practical examination. The marks awarded for specimen collection and assignments shall be noted in the record, at the time of first appearance and will be taken into account for subsequent appearances. Such marks awarded by the examiner will be furnished to the Head of the Department.
- 11.6. Two examiners appointed by the University, nominated by Head of the Department and recommended by the Dean will conduct the practical examination.

12. Re-appearance and Improvement Examination

- 12.1. Re-appearance and Improvement examinations are permitted only for the final theory and practical examinations (retaining marks obtained in mid-semester examination) at the time of semester examination, after the payment of fee prescribed by the university. A student is permitted to write re-appearance examination for the failed subjects only three times during n+2 years duration excluding the regular final examination. In the event of a

student failing to secure a pass in the three re-examinations permitted, he/she has to reregister the course along with juniors.

- 12.2. A student who failed in a course (subject) or awarded EE can take up re-examination without undergoing regular classes. A student who has not fulfilled attendance requirement should repeat the course to earn attendance before he/she is permitted to proceed to the next semester.
- 12.3. The student having an OGPA of less than 6.50 only is eligible to improve the grade point only once in courses completed earlier in which he/she had obtained grade point less than 8.00. In case a student fails to secure higher grade point in the subsequent attempts, the higher grade point secured by the student either in regular or improvement examination will be accounted. Improvement and re-examination will not be allowed in courses with only practical. Those who fail in the these subjects shall have to repeat the course in the subsequent year/ years.
- 12.4. Those who miss the study tours for any valid reason must undertake the tour along with juniors to complete the diploma programme
- 12.5. A continuing candidate cannot appear for more than six subjects in the reappearance examination at a time. The candidate who has completed the tenure of two years in the Diploma Programme (private candidate) cannot appear for more than 12 subjects in the reappearance examination at a time.
- 12.6. The candidates for the reappearance examinations will submit their applications through the Dean, Faculty of Agriculture who will scrutinize the applications to ensure compliance of regulation 12.1 and 12.3. The attested copy of all grade sheets pertaining to the reappearance examinations should be enclosed along with the applications.

13. Malpractices in Examinations

- 13.1. The Dean, Faculty of Agriculture shall be responsible for dealing all cases of unfair means by students in writing records, assignments and examinations.
- 13.2. The invigilator or the course teacher concerned shall report each case of unfair means with full details of the evidence and written explanation of the student concerned to the Dean immediately.
- 13.3. The Dean shall take appropriate steps on receipt of the report and the report will be sent to the Controller of Examinations for appropriate action as prescribed by the University

14. Regulations of Student Conduct and Discipline

- 14.1. Ragging Rules: Students found involved in ragging or in any other misconduct, or if a complaint is received from the affected student(s) to that effect, will be immediately expelled from the current semester and the Dean shall further constitute a committee to probe and conduct enquiry into the matter and based on the report of the committee, the Dean shall forward the same to the Registrar to pass the final orders on merit of case within three working days.

14.2. Unlawful Activities: In case of students found involved in any unlawful activities either within or outside the Hostel/College Campus, besides expulsion both from the Hostel and College, at the discretion of the Dean with the knowledge of the Registrar, the matter will be reported to the Police of the jurisdiction to be dealt with, in accordance with the appropriate law in force.

14.3. Ragging – An offence

Extract of Tamil Nadu Government Gazette – Extra ordinary dt. 29.01.1997 (Tamil Nadu Prohibition of Ragging Act, 1997).

In this Act, unless the context otherwise requires, “Ragging” means display of noisy, disorderly conduct, doing any act which causes or is likely to cause physical or psychological harm or raises apprehension or fear or shame or embarrassment to a student in any educational Institution and includes: teasing, abusing or playing practical jokes on or causing hurt to such student or asking the student to do any act or perform something which such student will not, in the ordinary course willingly act or perform. Ragging within or outside any educational institution is prohibited.

Who ever directly or indirectly commits, participates in, abets or propagates “Ragging” within or outside any educational institution, shall be punished with imprisonment for a term which may extend to two years and shall also be liable to fine which may extend to ten thousand rupees.

Any student convicted of an offence under section 4 shall also be dismissed from the educational institution and such students shall not be admitted in any other educational institution.

Without prejudice to the foregoing provision, whenever any student complains of ragging to the head of an educational institution, or to any other person responsible for the management of the educational institution, such head of the educational institution or person responsible for the management of the educational institution shall inquire into the same immediately and if found true shall suspend the student who has committed the offence from the educational institution.

On the recommendation of the Dean, Faculty of Agriculture, The Registrar will have full powers to punish any student who violates the rules by imposing a fine, suspension or expulsion. His decision is final and he need not assign any reason or explanation for the punishment awarded.

These rules will be altered or amended, and further rules may be added if necessary. All the rules for the time being in force should be observed by the students.

15. Award of Diploma

The Diploma namely Diploma in Horticulture shall be awarded under the seal of the University to the students who have successfully completed all the Diploma requirement as detailed below.

The candidates should have undergone successfully the prescribed course of study in the University. They shall further be required to have completed and

passed 65 course credits and shall have earned an overall grade point average (OGPA) of 6.50 out of 10 for all courses completed in Diploma in Horticulture programme. In addition to the above, students shall in the judgment of the Faculty, possess good conduct and character.

The University shall issue Provisional Certificate (PC) to the candidates after having passed all provisional examinations.

15.1 Class Ranking

In calculation of class equivalent for OGPA, the following classification shall be adopted.

OGPA	Class	
9.00 and above		- Distinction
8.00 to 8.99		- I Class
7.00 to 7.99		- II Class
6.50 to 6.99		- Pass

17. Removal of Difficulties

If any difficulty arises in giving effect to the provisions of these regulations, based on the recommendations of the Dean, the Vice-Chancellor may issue necessary orders, which appear to him to be necessary or expedient for removing the difficulty.

Sl.No.	Course No.	Course Title	Credit Hours
FIRST SEMESTER			
1.	HOR 111	Basics in Horticulture	2+1
2.	HOR 112	Plant Propagation and Nursery Management	1+1
3.	AGR 113	Fundamentals of Agronomy	1+1
4.	SAC 114	Soils and Fertility Management for Horticultural Crops	2+1
5.	COM 115*	Introduction to Computer Applications	0+1
6.	AGM 116	Soil and Applied Microbiology	1+1
7.	AEN 117	Basics in Applied Entomology	0+1
8.	PED 118*	Physical Education	0+1
		Total	7+8 =15
SECOND SEMESTER			
1.	HOR 121	Production Technologies of Fruit Crops	2+1
2.	HOR 122	Ornamental Gardening and Landscaping	2+1
3.	HOR 123	Production Technologies of Vegetable Crops	2+1
4.	HOR 124	Crop Production – I (Vegetable Crops)	0+2
5.	AGR 125	Irrigation and Weed Management in Horticultural Crops	1+1
6.	PAT 126	Basics in Plant Pathology	0+1
7.	AEG 127	Farm Machinery for Horticultural Crops	1+1
8.	ENG 128*	English Language for Effective Communication	0+1
		Total	8+9=17

Sl.No.	Course No.	Course Title	Credit Hours
THIRD SEMESTER			
1.	HOR 211	Production Technologies of Flower Crops	1+1
2.	HOR 212	Production Technologies of Medicinal and Aromatic Plants	1+1
3.	HOR 213	Crop Production-II (Flower Crops)	0+2
4.	HOR 214	Silvi-Horticulture	1+1
5.	HOR 215	Production Technologies of Spices and Plantation Crops	1+1
6.	AEN 216	Pests of Horticultural Crops and their Management	1+2
7.	PAT 217	Diseases of Horticultural Crops and their Management	1+2
8.	AHS 218	Fundamentals of Livestock and Poultry Management	1+1
		Total	7+11=18
FOURTH SEMESTER			
1.	HOR 221	Protected Cultivation	1+1
2.	HOR 222	Study Tour	0+1
3.	HOR 223	Practical Training in Hill Horticultural Crops	0+2
4.	HOR 224	Post Harvest Handling and Value Addition of Horticultural Crops	2+1
5.	AEX 225*	Extension Methods and Audio Visual Aids	1+1
6.	GPB 226	Seed Production Technology of Horticultural Crops	1+1
7.	AEC 227	Farm Management and Marketing	1+1
8.	TAM 228*	Language for Communication (jkpo; top jfty; ghpkhw;w topKiwfs;)	0+1
		Total	6+9 =15
		Grand Total	28+37= 65

SYLLABUS**HOR 111 : BASICS IN HORTICULTURE (2+1)****Objectives**

To impart the basic knowledge in horticulture and serve as a platform over which advanced technologies of horticulture can be built up.

THEORY**Unit-I : Scope and Importance of Horticulture**

Scope and importance of horticultural crops – divisions of horticulture – area and production – export and import – global scenario – classification of horticultural crops – nutritive value – horticultural zones of India and Tamil Nadu – research institutes related with development of horticulture.

Unit-II : Establishment of Orchard and Factors Influencing Crop Production

Establishment of orchard – principles, planning and layout – different planting systems – factors limiting horticultural crop production – manures and manuring – weed management – irrigation methods – influence of soil – physical and chemical properties and climatic factors – light, temperature, photoperiod, relative humidity, rainfall, micro climate and pollution.

Unit-III : Nursery Management and Cropping Systems

Nursery techniques – vegetable garden – nutrition garden, kitchen garden and other types of gardens – cropping systems – intercropping, multi – tier cropping – cover cropping – planting methods – mulching – principles of organic farming.

Unit-IV : Growth and Development

Bearing habits – flowering, pollination and fruit set – unfruitfulness – fruit drop – causes and prevention – training and pruning – use of growth regulators – rejuvenation of old orchards.

Unit-V : Protected Cultivation and Post – Harvest Technology

Basics of protected cultivation – green house components – structure for environmental control – post – harvest technology – importance and causes for post – harvest losses – maturity indices – harvesting methods.

PRACTICAL

Different features of orchard – planning and layout of orchard – tools and implements – different planting systems – nursery beds – training and pruning of fruit crops – preparation of fertilizer mixtures and field application – use of growth regulators – assessment of bearing habits – weed management – irrigation systems – structures for protected cultivation – judging the maturity indices of horticulture crops – harvesting methods and post – harvest handling.

Lecture Schedule

- 1) Scope, importance and nutritive value of horticultural crops.
- 2) Divisions of horticulture.
- 3) Area and production of horticultural crops.
- 4) Export and import of horticulture crops and their products – global and Indian scenario.
- 5) Classification of horticulture crops.

- 6) Different climate zones of India and Tamil Nadu in relation to horticulture crops.
- 7) Principles, planning and layout of orchard.
- 8) Different planting systems.
- 9) Nutrition garden, kitchen garden and other types of garden.
- 10) Soil and climate factors in relation to horticulture crop production.
- 11) Factors limiting horticulture crop production.
- 12) Fertility management in orchards.
- 13) Weed management and methods of weed control.
- 14) Methods of irrigation in relation to horticultural crops.
- 15) Study of cropping systems.
- 16) Study of multi – tier, inter cropping and cover crops – planting methods.
- 17) Mid Semester Examination.
- 18) Mulching – role of mulching – types of mulches for horticultural crop production.
- 19) Principles of organic farming.
- 20) Bearing habits of horticulture crops.
- 21) Study of flowering, pollination and fruit set in horticulture crops.
- 22) Unfruitfulness – causes and prevention in horticulture crops.
- 23) Fruit drop – causes and prevention in horticulture crops.
- 24) Principles and methods of training in horticulture crops.
- 25) Principles and methods of pruning in horticulture crops.
- 26) Methods of rejuvenation of old orchards.
- 27) Role of growth regulators in horticultural crops.
- 28) Principles and practices of protected cultivation.
- 29) Study of different types of media and protected structures for propagation.
- 30) Study of green house components
- 31) Environmental control for crop production.
- 32) Post – harvest technology – importance and causes for post – harvest losses.
- 33) Maturity indices – climacteric and non climacteric fruits.
- 34) Harvesting methods and Post harvest handling.

Practical Schedule

- 1) Study of different features of orchard.
- 2) Planning, layout and planting of fruit trees.
- 3) Identification of tools and implements.
- 4) Preparation of nursery beds and sowing vegetable seeds and transplanting of vegetable crops.
- 5) Practicing training of fruit trees.
- 6) Practicing pruning of fruit trees.
- 7) Identification of growth regulators – preparation and application.
- 8) Preparation of fertilizer mixtures and field application.

- 9) Practicing weeding including chemical weed control.
- 10) Layout of different irrigation systems and irrigation methods.
- 11) Study of bearing habits of horticultural crops.
- 12) Study of different structures for protected cultivation.
- 13) Study of different media for protected cultivation.
- 14) Practice in judging the maturity indices of fruits and vegetables.
- 15) Study of harvesting methods.
- 16) Visit to green houses.
- 17) Orientation for final practical examination.

REFERENCES

- 1) Chadha, K.L. 2002. Hand book of Horticulture, ICAR, New Delhi.
- 2) Jitendra Singh 2006. Basic Horticulture. Kalyani Publishers, New Dehli.
- 3) Kumar, N. 1997. Introduction to Horticulture, Rajalakshmi Publication, Nagercoil.
- 4) Kushal Kumar Misra and Rajesh Kumar.2014. Fundamentals of Horticulture. Biotech Books.
- 5) Peter, K.V. 2014. Basic of Horticulture. New India Publishing Agency.
- 6) Pradeep Sinha. 2014. Text Book of Horticulture. Sublime Publications.
- 7) Vijayakumar U.M.Rao.2008. Horticulture terms – Definition and terminology. IBD Publishers

HOR 112 : PLANT PROPAGATION AND NURSERY MANAGEMENT (1+1)

Objectives

Plant propagation is one of the fundamental agricultural operations which involves multiplication and perpetuation of seeds and planting material to achieve uniform stand of crops with high yield potential. This course deals with different methods of plant propagation and strategies for nursery management of various fruit crops. Knowledge of tools and implements is essential to carry out all scientific horticultural operations and also nursery management practices.

THEORY

Unit-I : Methods of Propagation

Scope and importance – propagation – overview – methods of sexual and asexual propagation – advantages and disadvantages of sexual and vegetative propagation.

Unit-II : Principles and Methods of Seed Propagation

Seed propagation – seed dormancy – internal and external factors – nursery techniques – prostray culture – apomixis – monoembryony, polyembryony – principles – utilization.

Unit-III : Propagation Structures

Propagation structures – mist chamber – cold frames – hot beds – humidifiers – green houses – glass houses – tools and implements – use of growth regulators in seed and vegetative propagation – physiological and anatomical basis of vegetative propagation.

Unit-IV : Asexual Propagation Techniques

Methods and techniques of cuttings, layering, grafting and budding – factors influencing rooting of cuttings, layering, budding, grafting – stock scion relationship – root stock influences – Propagation through specialized organs – – tuber, bulb, corm, bulbils, rhizome, runner, offshoot, crown, slips and sucker.

Unit-V: Micro Propagation

Micro propagation – culture media – culture conditions – meristem culture – callus culture – micro grafting – hardening of plants in nurseries – clonal orchards – nursery registration act.

PRACTICAL

Nursery bed preparation – seed treatment – seed sowing – – tools and implements – potting medium – containers for propagation of nursery plants – potting – repotting – liquid manures – propagation structures – – mist chamber, cold frames, hot beds, poly house, shade net house – raising of rootstocks and scion preparation – different techniques and practices of cutting, layering, grafting and budding – use of specialized organs – rejuvenation – project preparation for commercial nurseries – visit to private nurseries and tissue culture laboratory – working out economics.

Lecture Schedule

- 1) Scope and importance of plant propagation, study of sexual and asexual methods of propagation.
- 2) Advantages and disadvantages of sexual and vegetative propagation.
- 3) Seed dormancy – Internal and external factors.
- 4) Nursery techniques, protray culture, apomixis, monoembryony and polyembryony.
- 5) Propagation structures – mist chambers, cold frames, hot beds, humidifiers.
- 6) Construction of green houses and glass houses and its controlling system.
- 7) Tools and implements.
- 8) Use of growth regulators in seed and vegetative propagation.
- 9) Mid Semester Examination.
- 10) Types of cuttings and techniques of preparation.
- 11) Types of layering and techniques of preparation.
- 12) Grafting and budding methods and techniques of preparation.
- 13) Study of stock scion relationship.
- 14) Influence of root stock on scion – bud wood selection.
- 15) Propagation by specialized plant parts – bulbs and tubers.
- 16) Propagation by specialized plant parts – runners, suckers and other organs.
- 17) Micro propagation techniques.

Practical Schedule

- 1) Preparation of nursery bed, seed treatment and sowing.
- 2) Identification of various tools and implements.
- 3) Preparation of pot mixture and study of various containers.
- 4) Practices in potting, repotting and liquid manures.
- 5) Study of special structures for propagation viz., mist chamber, cold frames, hot beds, poly house, shade net house.
- 6) Raising of rootstocks and scion preparation.
- 7) Mist propagation techniques.
- 8) Practice in propagation by cuttings.
- 9) Practice in propagation by layering.
- 10) Practice in propagation by budding.
- 11) Practice in propagation by grafting.
- 12) Use of growth regulators in propagation.
- 13) Practices in separation and description of plant parts used for propagation.
- 14) Rejuvenation, top working and bridge grafting.
- 15) Practice in micro propagation and hardening methods.
- 16) Visit to tissue culture laboratory and controlled green houses and project preparation for commercial nurseries and visit to private nurseries.
- 17) Orientation for final practical examination.

REFERENCES

- 1) Bose, T.K., S.K. Mitra, M.K. Sadhu and B. Mitra. 1991. Propagation of Tropical and subtropical Horticultural Crops. Naya Prakash 206, Bidhan Sarani, Calcutta, Six. India.
- 2) Hartmann, H.T., D.E. Kester, F.T. Davies and R.L. Greeneve. 1997. Plant propagation – Principles and Practices. Prentice Hall of India Private Ltd., New Delhi.
- 3) Peter, K.V. S. Rajan and Baby Lissy Markose. 2007. Propagation of Horticultural Crops. Horticulture Science Series-6. New India Publishing Agency.
- 4) Singh, R.S., R. Bhagava. 2014. Propagation of Horticultural Plants – Arid and Semi – Arid Regions. New India Publishing Agency.
- 5) Reddy, Y.T.N., T. Janakiram and D. Satyanarayana Reddy. 2001. Scientific Nursery Management. The House of Sarpan (Media), Bangalore.
- 6) Prasad, S. and V. Kumar. 1999. Green House Management of Horticultural Crops. Agrobios India, Jodhpur.

AGR 113 : FUNDAMENTALS OF AGRONOMY (1+1)**THEORY****Unit-I : Introduction to Agriculture and Agronomy**

Agriculture – definition – scope of agriculture in India and Tamil Nadu – branches of agriculture – Agronomy – art, science and business of crop production. – Agronomical classification of crops – their importance – Major crops of India and Tamil Nadu. Factors affecting crop production – moisture, aeration, light, temperature and nutrients.

Unit-II : Basic Agricultural Operations

Basic principles of agricultural operations – tillage and tilth – objectives and types of tillage – primary tillage, secondary tillage and intercultural operations. Modern concepts of tillage. Implements and tools used in agriculture – seeds and sowing – seed treatment – Nursery – Transplanting. Cropping systems – definitions – principles.

Unit-III : Cultural Practices for Crops

Plant population and crop geometry. After cultivation – gap filling and thinning – Weeding and irrigation. Manures – organic manures – green manures – biofertilizers. Fertilizers – Methods of application – basal, split and foliar application. Organic farming – sustainable agriculture – definition, concepts. Meteorology – agricultural meteorology – definition – importance in Crop Production.

Unit-IV : Dry Farming Management

Dryfarming – definition – classification. Drought – definition – effects of drought on crop production – Drought management – Contingent crop planning. Soil moisture conservation approaches.

Unit-V : Watershed Management

Watershed management – definition – concepts – scope and importance. Water harvesting – farm pond, percolation pond.

PRACTICAL

Identification of crops in low land, irrigated upland and dry lands. Preparation of cropping scheme for different ecosystem – Acquiring skill and estimating the efficiency of tillage implements. Practicing the implements used for primary and secondary Tillage – Practicing the implements used in rice cultivation. Skill learning and practicing nursery bed preparation for low and irrigated uplands. Skill imparting practices in seed treatment – Use of bio fertilizers – Learning seed and seedling treatment, practicing sowing, transplanting, weeding and irrigation. Identification and application of organic manures and green manures – Inorganic fertilizers. Methods of utilization of organic wastes – Composting of coir pith. Measurement of growth and yield components of major crops. Visiting Agro – met observatory – Seed treatment technologies for dry farming. Preparation of contingency crop plan to mitigate aberrant rainfall situations – Visit to watershed.

Lecture Schedule

- 1) Agriculture – definition – scope of agriculture in India and Tamil Nadu – Branches of agriculture – agronomy – art and science of crop production.
- 2) Agronomic classification of crops – their importance, major crops of India and Tamil Nadu.
- 3) Factors affecting crop production – moisture, aeration, light, temperature and nutrients.
- 4) Cropping systems – principles – merits and demerits.
- 5) Basic principles of agricultural operations – Tillage and tith, objectives and types of tillage – primary and secondary tillage – intercultural operations.
- 6) Tools and implements used in agriculture, modern concepts of tillage.
- 7) Seeds and sowing – seed treatment – nursery – transplanting.
- 8) optimum plant population, crop geometry – after cultivation – gap filling and thinning.
- 9) Mid Semester Examination.
- 10) Weeding and irrigation – definition and importance.
- 11) Manures – organic manures, green manures, biofertilizers, fertilizers – Methods of application – basal, split and foliar application.
- 12) Organic agriculture, sustainable agriculture – definition – concept.
- 13) Meteorology – agricultural meteorology – importance of agricultural meteorology in crop production.
- 14) Dry farming, definition and concepts – drought – definition – Effects of drought on crop production.
- 15) Drought management strategies contingent crop planning and mid season correction.
- 16) *In-situ* soil moisture conservation techniques – water harvesting.
- 17) Watershed: definition, scope and principles of watershed management.

Practical Schedule

- 1) Identification of crops in low land, irrigated uplands and dryland.
- 2) Preparation of cropping scheme for different ecosystem.
- 3) Acquiring skill in the use of primary and secondary tillage implements.
- 4) Practicing the use of special purpose implements (puddler, rotary weeders and cono-weeder).
- 5) Skill learning and practicing nursery bed preparation for low lands and irrigated uplands.
- 6) Practicing main field preparation.
- 7) Seed treatment techniques.
- 8) Practicing sowing and transplanting.
- 9) Practicing manual weeding and spraying of herbicides with different formulations.
- 10) Practicing application of organic, inorganic, green manures and biofertilizers.

- 11) Inorganic fertilizers – identification of fertilizers – calculation based on fertilizer schedule.
- 12) Visiting Agro met observatory and getting acquaintance with instruments.
- 13) Soil erosion and soil conservation practices. Water harvesting structure and their use.
- 14) Drought management technologies to mitigate drought in dryfarming agriculture.
- 15) Preparation of contingency crop plan for aberrant rainfall situations.
- 16) Visit to watershed area to study the impact of various soil and moisture conservation methods.
- 17) Orientation for practical Examination.

REFERENCES

- 1) Sankaran, S. and V.T. Subbiah Mudaliar. 1997. *Principles of Agronomy*. The Bangalore Printing and Publishing Co. Ltd., Bangalore.
- 2) Gopaldaswamy, N. 1994. *Agricultural Meteorology*, Rawat publications, Jaipur.
- 3) Balsubramaniyan, P. and SP.Palaniappan, 2010. *Principles and Practices of Agronomy*. Agrobios. Jodhpur – 342 002.
- 4) Panda S.C. 2010. *Agro Meteorology and Contingent crop Planning*. Agrobios (India), Jodhpur.
- 5) Sudhagar Rao, G.B, M. Thiruppathi, C. Ravikumar and K.P. Senthilkumar, 2015. *Basic Agronomy*, Manibharathi Publication, Tamil Nadu.

SAC 114 : SOILS AND FERTILITY MANAGEMENT FOR HORTICULTURAL CROPS (2+1)

THEORY

Unit-I : Soil Physical Properties

Soil definition – it's major components – soil physical properties – soil texture, soil structure, bulk density, particle density, porosity – soil consistency – soil colour – soil water – soil air – soil temperature – their significance on crop production.

Unit-II : Soil Chemical Properties

Soil chemical properties – pH, EC, organic carbon – it's influence on soil properties, soil organic matter – composition, decomposition, carbon cycle, nitrogen cycle, soil micro – organisms.

Unit-III : Soil Fertility and Productivity

Soil fertility – definition, types, evaluation methods – soil productivity – definition – soil testing – definition, objectives – STL – functions – soil test based fertilizer recommendation – Soils of Tamilnadu – INM, IPNS, FUE.

Unit-IV : Manures and Fertilizers

Manures and fertilizers – definition, differences, classification – major nutrient fertilizers – N,P, K fertilizers – secondary and micronutrient fertilizers – complex and mixed fertilizers – losses of nutrients from soil – biofertilizers – plant growth regulators – Preparation of Enriched farm yard manure and micro nutrient mixtures.

Unit-V : Problem Soils and Irrigation Water

Problem soils – soil physical constraints – their management – soil chemical constraints – acid soil, saline soil, alkali soil, calcareous soil – formation, characteristics, reclamation – irrigation water – testing – quality indices – management of poor quality water.

PRACTICAL

Soil sampling – collection and processing – soil analysis – pH, EC, texture, bulk density, particle density, pore space – Determination of soil moisture – qualitative tests – manures, fertilizers, biofertilizers – method of application – Calculation of fertilizer dose for crops – foliar application – fertilizers, plant growth regulators – Identification of nutrient deficiency, toxicity symptoms in crops – preparation of enriched farm yard manure (EFYM), micronutrient (MN) mixture – visit to compost yard – irrigation water – quality analysis – interpretation.

Lecture Schedule

- 1) Soil definition – it's major components.
- 2) Soil physical properties – soil texture, soil structure.
- 3) Soil bulk density, particle density, porosity – soil consistency – soil colour.
- 4) Soil water – it's importance in crop production.
- 5) Soil air – soil temperature – it's importance in crop production.
- 6) Soil chemical properties – pH, EC, organic carbon.
- 7) Carbon cycle, nitrogen cycle.
- 8) Soil organic matter – composition, decomposition.
- 9) Soil organic matter – it's influence on soil properties.
- 10) Soil micro-organisms – bacteria, fungi and actinomycetes.
- 11) Soil fertility – definition, types, evaluation methods, approaches.
- 12) Plant nutrients – major, secondary and micro nutrients – forms, functions.
- 13) Plant – major, secondary nutrients – deficiency, toxicity symptoms, control measures.
- 14) Plant nutrients – micronutrients – deficiency, toxicity symptoms, corrective measures.
- 15) Soil productivity – definition – soil testing – definition, objectives – STL – functions.
- 16) Soil test based fertilizer recommendation – Soils of Tamilnadu.
- 17) Mid Semester Examination.
- 18) Integrated nutrient management (INM).
- 19) Integrated plant nutrient supply system (IPNS).
- 20) FUE – Techniques to enhance fertilizer use efficiency.
- 21) Manures and fertilizers – definition, differences, classification.
- 22) Major nutrient fertilizers – nitrogenous fertilizers.
- 23) Major nutrient fertilizers – phosphatic and potassic fertilizers.
- 24) Secondary nutrient fertilizers.
- 25) Micronutrient fertilizers, complex and mixed fertilizers.

- 26) Losses of nutrients from soil.
- 27) Bio-fertilizers – Azospirillum, Phosphobacteria, Rhizobium, Azotobacter, BGA, Azolla, VAM.
- 28) Plant growth regulators.
- 29) Preparation of enriched FYM and micronutrients mixtures.
- 30) Problem soils – soil physical constraints – their management.
- 31) Soil chemical constraints – acid soil – genesis, characteristics and reclamation.
- 32) Soil chemical constraints – saline soil – genesis, characteristics and reclamation.
- 33) Soil chemical constraints – alkaline soil – genesis, characteristics and reclamation.
- 34) Irrigation water – testing, quality indices & management of poor quality water .

Practical Schedule

- 1) Study of different soil types.
- 2) Soil sampling – skill learning in collection and processing.
- 3) Determination of soil texture by feel method.
- 4) Estimation of soil bulk, density particle density & pore space by measuring cylinder method.
- 5) Estimation of soil moisture by hot air oven – dry method.
- 6) Estimation of soil pH and EC.
- 7) Qualitative tests of manures, fertilizers and bio – fertilizers.
- 8) Calculation of fertilizer doses for different crops.
- 9) Foliar application of fertilizer nutrients.
- 10) Foliar application of growth regulators.
- 11) Identification of nutrient deficiency, toxicity symptoms in crops.
- 12) Preparation of enriched farm yard manure.
- 13) Preparation of micronutrient mixtures.
- 14) Visit to compost preparation unit.
- 15) Estimation of pH, EC in irrigation water.
- 16) Interpretation of irrigation water quality using analytical data.
- 17) Orientation for final practical examination.

REFERENCES

- 1) John Havlin, James Beaten, Samuel Tisdale, Werner Nelson. 2005. Soil Fertility and Fertilizers – An Introduction to Nutrient Management. 7th Edition, Prentice Hall. Upper Saddle River, NJ.
- 2) Kanwar, J.S. 1976. Soil fertility – Theory and Practice. ICAR, New Delhi.
- 3) Mengel, K. and E.A. Kirkby. 1987. Principles of Plant Nutrition. 4th Edition, International Potash Institute, Worblaufen – Bern, Switzerland.
- 4) Horst. 1995. Mineral Nutrition of Higher Plants. 2nd Edition. Marschner, Academic Press, Inc. San Diego, CA.

COM 115 : INTRODUCTION TO COMPUTER APPLICATIONS (0+1)

PRACTICAL

Computer – History – Types – Devices – Input, Output & Storage – Operating System – DOS & WINDOWS – Internet browsers, internet surfing, and Email – Introduction to Microsoft Office applications – MS WORD – Format, Insert, Paragraph, Page layout, Chart, Drawing, Picture, Table, Header & Footer, Equation & Diagram, Text box, Word art, Print preview & Print tools – MS EXCEL – Insert, Page layout & Drawing, Formulas, Chart, Pivot table, Equation, Print preview & Print tools – MS Powerpoint – Home, Insert, design, Transitions, animations, slide show, Slide master, handout master, notes master, print preview and print tools – Application of Computers in Agriculture.

Practical Schedule

- 1) Computer – history – types – devices – input, output & storage.
- 2) Operating system – DOS & WINDOWS.
- 3) Internet browsers, internet surfing, and Email.
- 4) Introduction to Microsoft Office applications.
- 5) MS Word – format, insert, paragraph & page layout tools.
- 6) MS Word – chart, drawing, picture & table tools.
- 7) MS Word – header & footer, equation & diagram tools.
- 8) MS Word – text box, word art, print preview & print tools.
- 9) Mid Semester Examination.
- 10) MS Excel – insert, page layout & drawing tools.
- 11) MS Excel – formulas & chart tools.
- 12) MS Excel – pivot table, equation, print preview & print tools.
- 13) MS Powerpoint – home, insert & design tools.
- 14) MS Powerpoint – transitions, animations & slide show tools.
- 15) MS Powerpoint – slide master, handout master, notes master, print preview & print tools.
- 16) Application of computers in agriculture.
- 17) Orientation for final examination.

AGM 116 : SOIL AND APPLIED MICROBIOLOGY (1+1)

Objectives

- To know the historical development of soil microbiology and the importance and distribution of soil microorganisms.
- To study the microbial transformations of C.N.P and Rhizosphere effect.
- To study the applied aspects of microorganisms.

THEORY

Unit-I: History Developments in Microbiology & Occurrence of Microorganisms

History developments in microbiology – contributions of Beijerinck, Winogradsky, Fleming and Waksman – Distribution and importance of soil

microorganisms – Factors affecting the occurrence and activities of soil Microorganisms.

Unit-II : Transformation of Carbon & Nitrogen in Soil

Carbon and nitrogen cycle in nature – mineralization – ammonification – nitrification – denitrification and biological nitrogen fixation : Symbiotic and non – symbiotic microorganism – process of nitrogen fixation.

Unit-III : Rhizosphere Microorganisms and its Importance

Microbial transformation of Phosphorus – Rhizosphere and its importance in crop Plants – R:S ratio – microbial interrelationship in soil – beneficial and harmful relationships.

Unit-IV : Biofertilizers – Production & Quality Control

Bacterial Biofertilizers *Rhizobium*, *Azospirillum*, *Azotobacter*, *Gluconoacetobacter*, *Azorhizobium* and phosphobacteria – plant growth promoting rhizobacteria (PGPR) – Fungal biofertilizers. Ecto and endomycorrhizae – Algal biofertilizers: Blue green algae and *Azolla* – Production and quality control of Biofertilizers.

Unit-V : Application and Uses of Microorganisms in Different Fields

Industrial utilization of microorganisms associated with food and dairy products. Microbes in pest and disease management. *Bacillus thuringiensis*, *Trichoderma viride*, *Beauveria*, *Verticillium*, *Metarrhizium*.

PRACTICAL

Enumeration of different kinds of microorganisms in soil – qualitative and quantitative method – Decomposition of organic matter. Isolation of rhizosphere microorganism. *Rhizobium*, *Azospirillum* and *Azotobacter* – Isolation of Phosphobacteria – observation of mycorrhizal roots.

Biofertilizers inoculants production – mother culture and starter culture – carrier materials – mixing and curing process – production of *Azolla* and BGA. Food spoilage – microorganisms involved in dairy products – Identification of biocontrol agents.

Theory Lecture Schedule

- 1) History and development in soil microbiology and contributions of Beijerinck, Winogradsky, Fleming and Waksman.
- 2) Distribution of soil microorganisms – importance of soil microorganisms.
- 3) Factors influencing the activities of soil microorganisms.
- 4) Carbon cycle – microbial Transformation of carbon in soil.
- 5) Nitrogen cycle – Microbial Transformation of nitrogen.
- 6) Symbiotic and non – symbiotic nitrogen fixation. process of nitrogen fixation and biochemistry of nitrogen fixation.
- 7) Transformation of Phosphorus.
- 8) Rhizosphere and its importance to crop plants.
- 9) R:S ratio.
- 10) Microbial interrelationship. Beneficial and harmful relationships.

- 11) Bacterial biofertilizers – *Rhizobium*, *Azospirillum*, *Azotobacter* & *Glucanoacetobacter*.
- 12) Fungal biofertilizers & phosphobacteria.
- 13) Algal biofertilizers – BGA, *Azolla*, Methods of biofertilizers production.
- 14) Quality control of biofertilizers.
- 15) Methods of biofertilizers application.
- 16) Microorganisms associated with food & dairy industries.
- 17) Microbes in pest and disease management.

Practical Schedule

- 1) Conn's direct microscopic count of estimating soil microbial population.
- 2) Standard plate count of soil microorganism or Dilution plate technique.
- 3) Buried slide technique.
- 4) Isolation of Root nodule bacterium – *Rhizobium*.
- 5) Isolation and purification of *Azotobacter*.
- 6) Isolation and purification of *Azospirillum*.
- 7) Isolation and purification *Glucanoacetobacter diazotrophicus*.
- 8) VAM Staining.
- 9) Isolation and purification of phosphobacteria.
- 10) Identification of endomycorrhizal fruiting bodies.
- 11) Isolation and purification of Blue Green Algae.
- 12) Bacterial Biofertilizer inoculants production.
- 13) Methods of application of biofertilizer and Quality control.
- 14) Mass production of fungal biofertilizer.
- 15) Estimation of rhizosphere microbial population an working out R:S ratio.
- 16) Isolation and estimation of microorganisms from spoiled dairy products.
- 17) Orientation for final practical examinations.

Reference Books

- 1) Alexander, M. 1985. Introduction to Soil Microbiology, John Wiley & Sons, New York.
- 2) Rangaswami, G. and Bagyaraji, D.J. 1992. Agricultural Microbiology. Asia Publishing House, New Delhi.
- 3) Subba Rao, N.S., 1995. Soil Microorganism and Plant Growth. Oxford & IBH New Delhi.
- 4) Subba Rao, N.S., 1994. Biofertilizers in Agriculture and Agroforestry. Oxford & IBH New Delhi.
- 5) Soil Microbiology, Ecology and Biochemistry. 4th Edn. Eldor Paul (Ed) Academic press Nov. 2014
- 6) Elsas, Jansson and Trevorr (EDS) 2006. Modern Soil Microbiology. 2nd edn CRC press.
- 7) Roy A.K 2007. Rhizosphere Biotechnology: Plant Growth Retrospect and Prospect. Scientific Publishers (inda), Jodhpur.

AEN 117 : BASICS IN APPLIED ENTOMOLOGY (0+1)**Objectives**

To impart basic practical knowledge on insects as pests and integrated management strategies and culturing of silkworms and honey bees.

PRACTICAL

Insect pest – Definition – Characters of an insect. Basic knowledge about insect groups – adaptations. Life history and immature stages of Insects, Pest – categories – causes for pest for outbreak. Field diagnosis of insect pest damage – assessment – surveillance. Integrated pest management – ETL and EIL. Different types of pest management strategies – Natural enemies – Production of predators and parasitoids. Insecticides – Groups – Use – Application methods. Productive insects – Culturing of mulberry silkworm, Honey bees – role – methods of bee keeping, bee enemies, lac culture – lac insects and lac products and other minor productive insects.

Practical Schedule

- 1) Structure of grass hopper – a typical insect pest.
- 2) Structural, anatomical and behavioral adaptations of different groups of insects. Life history and immature stages of Insects.
- 3) Pest – categories – causes for pest for outbreak. Insect pest damage – Identification assessment and surveillance.
- 4) Integrated pest management – ETL and EIL. Different types of pest management strategies.
- 5) Identification and mass multiplication of important predators.
- 6) Identification and mass multiplication of important parasitoids.
- 7) Identification and mass multiplication of important entomopathogens.
- 8) Groups of insecticides, their use and methods of application.
- 9) Mid Semester Examination.
- 10) Acquaintance with honey bee species, castes of bees and structural adaptations.
- 11) Acquaintance with Bee – keeping equipment and bee forage plants.
- 12) Studies on seasonal management and identification of enemies of honey bees.
- 13) Identification of Silkworm types – mulberry, Eri, Tasar and Muga silkworms and acquaintance with life stages of mulberry silkworm. Acquaintance with Mulberry varieties and preparation of mulberry cuttings.
- 14) Identification of rearing appliances of mulberry silkworm and acquaintance with methods of disinfection. Handling of silkworm in Chawki rearing and Late age rearing.
- 15) Pests and diseases of silkworms.
- 16) Identification of lac insect, lac products and other minor productive insects.
- 17) Final examination.

REFERENCES

- 1) Abrol. D. P. 2009. *Bees and Bee – keeping in India*. Kalyani Publishers, New Delhi. 705 p.
- 2) Dandin, S.B., and K. Giridhar. 2015. *Hand book of Sericulture Technologies*. Central Silk Board, Bangalore, 287 p.
- 3) David, B.V. and Ramamurthy, V.V. 2010. *Elements of Economic Entomology*. (Revised edition). Namurtha Publications, Chennai. 624 p.
- 4) Jonathan, E.I. 2010. *Fundamentals of Plant Nematology*, Devi Publications, Triruchirapalli. 232 p.
- 5) Mujeebur Rahmankhan and Shamim Jairajpuri, M. 2012. *Nematode Infestations – Part III: Horticultural Crops*, The National Academy of Sciences, Allahabad, 613 p.
- 6) Dhaliwal, G.S. and Ramesh Arora. 1998. *Principles of Insect Pest Management*. Kalyani Publishers, New Delhi. 395p.
- 7) Srivastava, K.P. 2003. *A Text Book of Applied Entomology*. Vol. I & II. Kalyani Publishers. 257 p and 319 p.

PED 118 : PHYSICAL EDUCATION (0+1)**Practical Schedule**

Biomotor abilities – strength, agility, co-ordination, flexibility, endurance and speed. Conditioning exercises, skill development in any one of the major games, Badminton, Ball Badminton, Basket Ball, Cricket, Football, Kabaddi, Kho-Kho, and Volley Ball. Skill development in athletic activities before start, loosening up, standing, sitting and relaxation. Posture and Exercises for good posture.

SECOND SEMESTER**HOR 121 : PRODUCTION TECHNOLOGIES OF FRUIT CROPS (2+1)****Objectives**

This course will provide the requisite knowledge and skill for cultivation of tropical, sub tropical and temperate fruit crops.

THEORY**Unit-I : Importance of Pomology**

Definition – area and production of fruit crops in Tamil Nadu – orchard management – definition – selection and layout of orchard – physical features in orchard.

Unit-II : Production Technology – I

Study of cultural practices of the following fruit crops with reference to soil, climate, varieties, methods of propagation, nutrient, irrigation and weed management practices – training and pruning – role of growth regulators – maturity standards for harvesting – post harvest technology of fruit crops – yield – grading – packing – storage and value added products.

Mango, Banana, Grapes, Papaya and Aonla.

Unit–III : Production Technology – II

Sapota, Guava, Citrus, Jack, Pineapple and Avocado.

Unit–IV : Production Technology – III

Apple, Pear, Plum and Peach

Unit–V : Organic Production and GAP in Fruit Crops

Organic fruit production and Good Agricultural Practices in fruit crops

PRACTICAL

Layout of orchard – methods of planting – manuring and irrigation methods – training and pruning of different fruit crops – judging maturity standards of major fruit crops – pest and disease management in fruit crops – visit to commercial orchards – fruit processing Unit–orchard planning and budgeting – calendar of operation for important fruit crops – working out cost of cultivation for important fruit crops – Maintenance of orchard accounts and records.

Lecture Schedule

- 1) Definition – Area and production of fruits in Tamil Nadu.
- 2) Orchard management – Definition, objectives, scope and importance, physical features in orchard.
- 3, 4 & 5) Study of cultural practices of mango.
- 6, 7 & 8) Study of cultural practices of banana.
- 9 & 10) Study of cultural practices of grapes.
- 11 & 12) Study of cultural practices of papaya.
- 13 & 14) Study of cultural practices of sapota.
- 15 & 16) Study of cultural practices of guava.
- 17) Mid Semester Examination.
- 18 & 19) Study of cultural practices of citrus.
- 20 & 21) Study of cultural practices of aonla.
- 22 & 23) Study of cultural practices of jack.
- 24) Study of cultural practices of pineapple.
- 25) Study of cultural practices of avocado.
- 26) & 27) Study of cultural practices of apple.
- 28) & 29) Study of cultural practices of pear.
- 30) Study of cultural practices of peach.
- 31) Study of cultural practices of plum.
- 32) Introduction to Organic fruit production.
- 33 & 34) Good Agricultural Practices in fruit crops.

Practical Schedule

- 1) Selection and layout of orchard and physical features in orchard.
- 2) Different planting systems in fruit crops.
- 3) Practices in mango propagation.
- 4) Practicing pruning in mango.
- 5) Practicing top working and rejuvenation of senile mango orchards.
- 6) Practicing sucker treatment for banana and planting.

- 7) Practices in grapes propagation.
- 8) Practicing training in grapes.
- 9) Practicing pruning in grapes.
- 10) Nursery practices for papaya.
- 11) Practicing papain extraction from Papaya.
- 12) Practices in sapota propagation.
- 13) Practices in guava propagation.
- 14) Nursery practices for citrus.
- 15) Irrigation management in fruit crops.
- 16) Working out cost economics of cultivation of fruit crops.
- 17) Orientation for final practical examination.

REFERENCES

- 1) Chattopadhyay, T.K. 2007. A Text Book on Pomology (4 volumes). Kalyani Publishers, Ludhiana.
- 2) Radha, T. and L. Mathew. 2007. Fruit Crops (Horticultural Science Series Vol. III). New India Publishers, New Delhi.
- 3) Veeraraghavathatham, D., M. Jawaharlal, S. Jeeva and S. Rabindran 2004. Scientific Fruit culture, Suri Associates, Coimbatore.

HOR 122 : ORNAMENTAL AND LANDSCAPE GARDENING (2+1)

Objectives

To study the basic principles and practices of landscape gardening, different styles of gardens, living and non-living components and special features in a garden and to make on-site analysis, designing with garden elements and principles manually and using softwares.

THEORY

Unit-I : History of Gardening and Principles of Landscaping

Ornamental and landscape horticulture – definitions – scope – importance of gardening – history of gardening – types of gardens – Hindu, Buddhist, Persian, Mughal, Japanese, English, French and Italian garden – formal, informal and beauty elements – basic principles of gardening.

Unit-II : Soft Scape Elements

Soft scape elements (living components) – trees – shrubs – shrubbery – creepers – climbers – herbs – annuals – hedges – edges – topiary – trophy – flowers and foliage beds – carpet beds – palmatum – ferns – rosarium – rockery – sunken garden – hanging baskets – cacti and succulents plants – basic function and utility – their culture – training and pruning – lawn – lawn grasses – methods of establishment – Maintenance of lawn – house plants – Indoor gardening – psychological and social aspects of ornamental plants.

Unit-III : Hard Scape Elements

Hardscape elements (non – living component) – garden adornments – fences – gates – arches – pergolas – walks – paths – roads – paving – borders and edges – water features – pools and ponds – cascades – falls – bridges – fountains – lights

and lamp posts – garden seats – statues – decks – bird's bath – sundials – urban – planter boxes – trellis – gazebo – designing – basic function and utility – fabrication – establishment and maintenance – non living components for special situations.

Unit-IV : Landscape Designing and Executions

Basic concepts of designing gardens – site analysis – client preference – landscape drawing – types of drawing – plan view – elevation and perspective diagrams – manual drawing – computerized drawing – plan to scale/not to scale – symbols/legends – designing for residences – educational institutes – industrial garden – public parks – amusement and theme parks – traffic islands.

Unit-V : Conceptual Gardening and Horticultural Crafts

Bio – aesthetic planning – water garden – floating plants – oxygenating plants – bog garden – vertical garden – rock garden – roof garden – modern day special types of gardens – yoga and meditation garden – instant garden – xeriscaping – bonsai – plants for bonsai – methods of bonsai culture – terrarium – flower arrangement – types of flowers – concepts – styles – purpose – methods – cut foliage – its uses in flower arrangement – importance in flower arrangement – dry flower making – vegetable and fruit carving – plant jewels.

PRACTICAL

Identification of ornamental plants and garden components – study of form, size shape, texture, flowering season and flower colour of different living components – Identification and description of trees, shrubs, flowers beds, foliage beds, climbers and creeper, hedges, edges, cacti, succulents, ferns and palms. Evaluation of different garden sites in the campus based on the basic principles – Study of different styles of garden – lawn – study of types of grasses – establishment, care and maintenance of lawn – art of topiary – identification, planning and designing of non – living components – principles and concepts in garden designing – preparation of landscape design plan for home, institution and industries – study on special types of garden – preparation of landscape project – study on horticultural crafts – bonsai, terrarium and flower arrangement – visit to various gardens.

Lecture Schedule

- 1) Garden components, basic functions and utility.
- 2) Trees and shrubs in landscaping.
- 3) Creepers, climbers in landscaping.
- 4) Herbs, annuals, hedges and edges in landscaping.
- 5) House plants and indoor gardening.
- 6) Study of ferns, cacti and succulents.
- 7) Topiary, trophy, flower beds and other living components in landscaping.
- 8) Propagation of ornamental plants.
- 9) Training, pruning, care and maintenance of ornamental plants.
- 10) Lawn – establishment and maintenance.
- 11) Psychological and social aspects of ornamental plants.
- 12) Hardscape elements in landscape.

- 13) Basic function, utility, fabrication and maintenance of non – living components.
- 14) Water features, fountains, fences, gates, arches, pergolas and garden paths in landscaping.
- 15) Light, lamp posts and other ornamental structures.
- 16) Living and non – living components for special situations.
- 17) Mid Semester Examination.
- 18) Site analysis, cliental preference and principles of landscape drawing.
- 19) Elements of beauty.
- 20) & 21) Fundamentals of manual drawing – plan view, elevation and perspective diagrams.
- 21) Computer Aided Designing in landscape.
- 22) Landscape designing for residence.
- 23) Landscape designing for educational institutes.
- 24) Landscape designing for industry.
- 25) Landscape designing for public park/theme park.
- 26) Landscape designing for traffic island.
- 27) Oxygenating plants and xeriscaping.
- 28) Bog, vertical and roof garden.
- 29) Studies on modern day special types of garden.
- 30) Horticultural crafting – bonsai and bonsai culture.
- 31) Flower arrangements.
- 32) Terrarium.
- 33) Cut foliage – importance of cut foliage and Vegetable and fruit carving, plant jewels.

Practical Schedule

- 1) Identification of ornamental plants.
- 2) Identification of different components – their form, size, shape, texture flowering and other beauty components.
- 3) Evaluation of different garden sites in campus.
- 4) Description of trees, shrubs, herbs and annuals.
- 5) Description of climbers, creepers, flowers and foliage beds.
- 6) Art of topiary, trophy and carpet beds.
- 7) Identification of lawn grasses.
- 8) Methods of establishment of lawn grasses.
- 9) Maintenance of lawn grasses.
- 10) Description of non – living components.
- 11) Study on beauty components.
- 12) Principles and fundamentals of designing garden.
- 13) Practices on manual and computer aided landscape designing.
- 14) Preparation of landscape plan for home, Institute and Industry gardens.
- 15) Preparation of landscape plan for public parks.

- 16) Practices on Horticultural crafts – bonsai, terrarium and flower arrangements, Vegetable and fruit carving.
- 17) Orientation for final practical examination.

REFERENCES

- 1) Bhattacharjee, S.K. 2004. Landscape Gardening and Design with plants. Aavishkar Publishers and Distributers, Jaipur.
- 2) Bose T.K., B. Chowdhury and S.P. Sharma 2001. Tropical Garden Plants in Colour. Horticulture and Allied Publishers, Kolkata.
- 3) Chadha, K.L. and B. Choudhury 2014. Ornamental Horticulture in India. ICAR. Krishi Bhavan, New Delhi.
- 4) Karuppaiah P. and K. Manivannan. 2016. Ornamental Horticulture. Agrobios (India) Jodhpur.
- 5) Nambisan, K.M.P. 1992. Design Elements of Landscape Gardening, Oxford and IBH Publications Co. (P) Ltd., Kolkata.
- 6) Randhawa, G.S. and A. Mukhopadhyay. 1998. Floriculture in India. Allied publishers Limited, New Delhi

HOR 123 : PRODUCTION TECHNOLOGIES OF VEGETABLE CROPS (2 + 1)

Objectives

To impart knowledge on the scenario of advanced production techniques and production constraints in vegetables.

THEORY

Unit-I : Scope and Importance of Olericulture

Scope and importance – area and production, global and national scenario, institutions involved in vegetable crops research – export potential – constraints in vegetable production – classification of vegetable crops – types of vegetable nutrition garden, kitchen garden, truck garden, market garden, roof garden, floating garden – vegetable forcing – contract farming – rice fallow cultivation, river bed cultivation, rain fed cultivation, – GAP in vegetable production – export standards of vegetables.

Unit-II : Solanaceous and Malvaceous Vegetable Crops

Origin and distribution – area and production – composition and uses – climate and soil requirements – season – varieties and hybrids – seed rate – nursery practices – containerized transplant production and transplanting – preparation of field – spacing – cropping system – planting methods – manuring and nutrient management – water and weed management – mulching – nipping – fertigation – nutrient deficiencies – physiological disorders – growth regulators – sex expression – maturity indices – harvest – yield – seed production and storage of the following crops:

Tomato, brinjal, chilli, capsicum and bhendi.

Unit-III : Cucurbitaceous Vegetable Crops

Ash gourd, pumpkin, bottle gourd bitter gourd, snake gourd, ribbed gourd, watermelon, musk melon, coccinia, cucumber and gherkin.

Unit-IV : Legumes, Bulbs and Tuber Crops

Peas and Beans, amaranthus, onion, potato, tapioca and sweet potato.

Unit-V : Temperate Vegetables

Cauliflower, cabbage, knol – khol, turnip, beetroot and carrot.

PRACTICAL

Identification and description of vegetable crops – layout of kitchen garden – nursery practices and transplanting – preparation of field and sowing/planting for direct sown/transplanted vegetable crops – manures and fertilizer application/fertigation schedule and intercultural operations – mulching – growth regulators – nipping – identification of nutrient deficiencies – physiological disorders – harvest indices and maturity standards – post – harvest handling and storage – marketing – cost of cultivation – project preparation for commercial cultivation – visit to commercial vegetable growing areas.

Lecture Schedule

- 1) Area, production, world scenario and industrial importance.
- 2) Export potential of vegetables.
- 3) Constraints in vegetable production.
- 4) Classification of vegetable crops.
- 5) Effect of climate, soil, water and nutrients on vegetable crop production.
- 6) Cropping systems in vegetable crops.
- 7) Types of vegetable farming.
- 8) Contract farming.
- 9) Rice fallow cultivation, river bed cultivation and rainfed cultivation.
- 10) GAP in vegetable production.
- 11) Origin and distribution – importance and uses – climate and soil requirements – season – varieties and hybrids – seed rate – nursery practices – containerized transplant production and transplanting – preparation of field – spacing – planting systems – planting methods – manuring and nutrient management – water and weed management – fertigation – nutrient deficiencies – physiological disorders – use of chemicals and growth regulator – sex expression – constraints in production – harvest – yield and storage of the following crops:
 - 12) Tomato.
 - 13) Brinjal.
 - 14) Chilli.
 - 15) Capsicum.
 - 16) Bhendi.
- 17) Mid Semester Examination.
- 18,19,20 & 21). Cucurbitaceous vegetables.
- 22 & 23). Leguminous vegetables.
24. Amaranthus and Moringa.
25. Onion.
26. Potato.
27. Tapioca.

28. Tapioca and Sweet potato.
29. Peas.
30. Cauliflower.
31. Cabbage.
32. Knolkhol and Turnip.
33. Beetroot.
34. Carrot.

Practical Schedule

- 1) Preparation of nursery bed, containerized transplant production and sowing of vegetable seeds.
- 2) Preparation of field – raising of a transplanted vegetable crop.
- 3) Preparation of field, sowing of cucurbitaceous, perennial and leafy vegetable and tuber crops.
- 4) Identification and description of varieties and hybrids of solanaceous and leguminous vegetables.
- 5) Identification and description of varieties and hybrids of bhendi, cucurbits, root and tuber crops.
- 6) Planning and lay out of kitchen / nutrition garden.
- 7) Study of rain fed and padugai land cultivation practices in vegetable crops.
- 8) Practices in manuring and fertilizer application in vegetable crops.
- 9) Practices in irrigation practices of vegetable crops.
- 10) Preparation of plant growth regulator spray solution – their usage in tropical vegetable crops.
- 11) Identification of nutrient deficiencies, physiological disorders and corrective measures in vegetable crops.
- 12) Maturity indices, harvesting and post – harvest handling of vegetable crops.
- 13) Practices in seed production techniques in vegetable crops.
- 14) Commercial vegetable production in protected structures.
- 15) Project preparation for commercial cultivation of tropical vegetable crops.
- 16) Visit to commercial vegetable production units.
- 17) Orientation for final practical examination.

REFERENCES

- 1) Bishwajit Choudhury. 2003. Vegetables. International Book Trust, New Delhi.
- 2) Bose, T. K, Kabir, J., Maity T. K., Parthasarathy V. A., and Som M. G., 2002. Vegetable Crops Vol. I, II & III. NayaProkash, Kolkata.
- 3) Gopalakrishnan, T.R., 2007. Vegetable Crops. New India Publishing Agency, New Delhi.
- 4) Nem Pal Singh. A.K. Bhardwaj, K.M. Singh and Abnish Kumar.2004.Modern Technology on Vegetable production. International Book Distributing Co., Lucknow.
- 5) Pranab Hazra, A. Chattopadhyay, K. Karmakar and S. Dutta. 2010. Modern Technology in Vegetable production. New India Publishing Agency, New Delhi.

- 6) Uma Shankar Singh, 2008. Indian Vegetables. Anmol publications Pvt., Ltd., New Delhi.
- 7) Veeraraghavathatham. D., M Jawaharlal and Seemanthini Ramdas. 1991. A guide on vegetable culture. A. E. Publications, Coimbatore.
- 8) Vishnu Swarup, 2006. Vegetable science and technology in India. Kalyani publishers, New Delhi.

HOR 124 : CROP PRODUCTION – I (VEGETABLE CROPS) 0+2

Objectives

This course shall provide hands on training on planning, raising of transplants, production and protection of vegetables crops. At the end of this course the student shall be able to demonstrate the knowledge, skill and attitude required for cultivation of vegetable crops.

PRACTICAL

Preparation of raised nursery bed – Seed treatment – container sowing – pest and disease management in nursery – Field lay out and main field preparation – ridges and furrows – direct sowing, transplanting – manuring – irrigation – earthing up and weed control – herbicide application – Special horticultural practices (Training/ staking/pruning) – Foliar application of nutrients and growth regulators – recording observations on growth, yield and quality – nutrient deficiency, physiological disorders and their management – pest and disease management – maturity indices – harvesting techniques, grading, sorting and packing – working out cost of cultivation.

Practical Schedule

- 1) Nursery practices for production of seedlings in containers.
- 2) Raised bed nursery preparation for vegetable crops.
- 3) Seed treatment practices.
- 4) Pest and disease management in nursery.
- 5) Practicing layout of main field and practicing main field preparation.
- 6) Practicing the basal application of manures.
- 7) Preparation of ridges and furrows / paired row systems.
- 8) Practicing direct sowing.
- 9) Practicing transplanting techniques.
- 10) Practicing irrigation methods.
- 11) Formulating and practicing fertigation schedule to vegetable crops.
- 12) Practicing earthing up.
- 13) Practicing hand weeding.
- 14) Spray volume calculation and application of herbicides.
- 15) Recording observations on growth parameters.
- 16) Practicing foliar application of nutrients /growth regulators.
- 17) Mid Semester Examination.

- 18) Practicing special horticultural practices for vegetables (training/staking/pruning).
- 19) Identification of different physiological disorders and their management.
- 20) Identification of different nutrient deficiency symptoms and their management.
- 21) Identification of important pests and their management.
- 22) Spray volume calculation and application of pesticides.
- 23) Identification of important diseases and their management.
- 24) Spray volume calculation and application of fungicides.
- 25) Use of bio control agents.
- 26) Assessing the maturity indices of vegetables.
- 27) Assessing the quality parameters of vegetable crops.
- 28) Recording observations on yield parameters.
- 29) Practicing harvesting techniques in vegetable crops.
- 30) Practicing grading, sorting, and packing techniques of vegetable crop.
- 31) Visit to commercial packing units of vegetable crops.
- 32) Working out the economics of cultivation of direct sown and transplantable vegetable crops.
- 33) Visit to precision farming fields.
- 34) Orientation for final practical examination.

REFERENCES

- 1) Bailey, L.H. 1999. Principles of Vegetable Cultivation. Discovery Publishing House, New Delhi.
- 2) Gopalakrishnan, T.R. 2007. Vegetable Crops. New India Publication Agency, New Delhi.
- 3) Pranab Hazra, A. Chattopadhyay, K., Karamakar and S. Dutta. 2010. Modern Technology in Vegetable Production New India Publication Agency, New Delhi.
- 4) PremSingh Arya. 2002. A text book of vegetable culture, Kalyani Publishers, New Delhi.

AGR 125 : IRRIGATION AND WEED MANAGEMENT FOR HORTICULTURAL CROPS (1+1)

THEORY

Unit-I : History and Development of Irrigation

Role of water for growth and development of crops – need for scientific water management in India. Irrigation systems of India and Tamil Nadu – soil – plant – water relationship – soil moisture constants. Water requirement – water requirement for important horticultural crops – factors affecting water requirement.

Unit-II : Water Requirement and Methods of Irrigation

Critical stages for irrigation for fruits and vegetables – scheduling of irrigation – different approaches – water management for different horticultural crops. Irrigation methods – surface, sub – surface and advanced methods – drip, sprinkler – layout, suitability, merits and demerits. Merits of fertigation – water soluble fertilizers. Quality of Irrigation water.

Unit-III : Weed Biology and Ecology

Weeds – definitions – harmful and beneficial effects – dissemination. Seed dormancy – crop weed competition and allelopathy – concepts of weed prevention – methods of weed management – cultural, chemical, biological methods – integrated weed management.

Unit-IV : Chemistry of Herbicides

Herbicides – classification – formulation – methods of application; introduction to adjuvants and their use in herbicides.

Unit-V : Weed Management

Weed management for major vegetable, flower and fruit crops, lawns and plantation crops. Aquatic and parasitic weeds and their management.

PRACTICAL

Determination of soil moisture, field capacity and wilting point – Measurement of irrigation water – units – moisture extraction pattern – WUE – Methods to enhance WUE – Acquiring skill in different surface and sub surface irrigation – design and operation of sprinkler and drip irrigation – calculation on irrigation agronomy water – Identification of wet, dry and garden land weeds – Agronomic method of weed management – Herbicides – classification – formulations – calculations – equipments – WCE – economics – problematic weeds – weed survey.

Lecture Schedule

- 1) Role of water for growth and development of crops – Need for scientific water management in India.
- 2) Water resources of India and Tamil Nadu – Irrigation systems of India and Tamil Nadu.
- 3) Soil – plant – water relationship – Soil water movement – Water movement along soil – plant atmosphere system.
- 4) Soil moisture constants – saturation – field capacity – permanent wilting point – available soil moisture – moisture equivalent – hygroscopic coefficient – determination – uses.
- 5) Soil moisture extraction pattern – Crop water requirement – Consumptive use (CU) – PET. Water requirement for different horticultural crops – factors affecting crop water requirement – Critical stages for irrigation for fruits and vegetables.
- 6) Scheduling of irrigation – different approaches – Climatological approach, empirical methods, crop co-efficient.
- 7) Methods of irrigation – surface (flooding, beds and channels, border strip, ridges and furrows, broad bed and furrows, surge irrigation) and sub – surface method.
- 8) Micro irrigation system (drip and sprinkler irrigation) – suitability, components, layout, operation, advantage and disadvantage.
- 9) Mid Semester Examination.
- 10) Water solute fertilizers for fertigation and Quality of irrigation water.
- 11) Weeds – Definition, classification and characteristics, harmful and beneficial effect of weeds – weed seed dissemination and dormancy.

- 12) Crop weed completion and Allelopathy – Concepts of weed prevention.
- 13) Principles and methods of weed management: Preventive, cultural, mechanical, chemical, biological and IWM.
- 14) Classification and characteristics of herbicides and herbicide formulations – Methods of herbicide application.
- 15) Adjuvants – Uses – Weed management in major vegetable, fruit and flower crops.
- 16) Weed management in lawns and plantation crops.
- 17) Aquatic and , parasitic weeds and their control.

Practical Schedule

- 1) Determination of soil moisture content by gravimetric method and other improved devices.
- 2) Determination of field capacity and wilting point.
- 3) Measurement of irrigation water with weirs, flumes and units.
- 4) Moisture extraction pattern of vegetable and fruit crops.
- 5) Water use efficiency and methods to improve it.
- 6) Acquiring skill in different land shaping methods for surface irrigation.
- 7) Layout, operation and maintenance of drip and sprinkler irrigation systems.
- 8) Calculations on irrigation agronomy.
- 9) Acquiring skill in on farm irrigation structures.
- 10) Identification of weeds in different eco system.
- 11) Agronomic methods of weed control.
- 12) Identification of herbicides and its requirement calculations.
- 13) Herbicides application equipments.
- 14) Management of aquatic, problematic and parasitic weeds.
- 15) WCE and economics of different weed control options.
- 16) Weed survey and its uses.
- 17) Orientation for final practical examination.

REFERENCES

- 1) Michal, A.M., 2010. *Irrigation – Theory and Practice*. Vikas Publishing House Pvt. Ltd., New Delhi.
- 2) Panda, S.C. 2007. *Principles and Practices of Water Management*. Agrobios Publishers.
- 3) Sankara Reddy, G.H. and T. Yellamanda Reddy. 2003. *Efficient use of Irrigation Water*. Kalyani Publishers, New Delhi.
- 4) Gupta, O. P. 2010. *Weed Management – Principles and practices*. Agrobios, Jodhpur.
- 5) Rao, V. S. 2000. *Principles of Weed Science*. Oxford and IBH Publishing Co. New Delhi.

PAT 126 : BASICS IN PLANT PATHOLOGY (0+1)

Objectives

The subject covers the various principles of Plant Pathology and the principles involved in the plant disease management. Also classification of fungicides, methods of application of fungicides and employing the various bio – control agents used in the management of crop diseases are taught.

PRACTICAL

Field diagnosis and identification of crop diseases. Classification of plant diseases – Disease triangle – Disease surveillance, assessment and forecasting – Diagnosis of plant diseases – Protection of crops from air – borne, seed – borne, soil – borne and vector – borne plant diseases – Physical methods – soil solarization, Hot water treatment, Incineration, Chemical control of plant diseases – fungicides – Different group of fungicides and antibiotics in plant disease management – Biological control of plant diseases – Plant products and Antiviral principles – method of application, Identification and monitoring of fungal, bacterial, phytoplasmal and viral diseases – Mass production of *Trichoderma* and *Pseudomonas*.

Practical Schedule

- 1) Disease triangle.
- 2) Classification of plant diseases.
- 3) Field diagnosis and identification of crop diseases.
- 4) Disease surveillance, assessment and forecasting – Diagnosis of plant diseases
- 5) Protection of crops from air – borne, seed – borne, soil – borne and vector – borne plant diseases.
- 6) Physical methods – soil solarization, Hot water treatment, Incineration, Chemical control of plant diseases.
- 7) Fungicides – Different group of fungicides and antibiotics in plant disease management.
- 8) Biological control of plant diseases.
- 9) Plant products in disease management.
- 10) Antiviral principles.
- 11) Method of application.
- 12) Identification and monitoring of fungal, bacterial, phytoplasma and viral disease.
- 13) Mass production of *Trichoderma*.
- 14) Mass Production of *Pseudomonas*.
- 15) Identification of fungal and bacterial, Phytoplasmal crop diseases.
- 16) Identification of different groups of fungicides, bactericides, their preparation and use.
- 17) Orientation for Final Practical Examination.

REFERENCES

- 1) Agrios, G.N. 2005. Plant Pathology. 5th Edition Academic Press, New York.
- 2) Chattopadhyay, S.G. 1998. Principles and procedure of plant protection – Oxford and IBH publication, New Delhi.

- 3) Nene, Y.L. and Thapliyal, P. N. 1998. Fungicides in Plant Disease Control. Oxford and IBH Publishing Co. Ltd., New Delhi.
- 4) Prakasam, V., Raguchander, T and Prabakar, K. 1998. Plant Disease Management, A.E. Publication, Coimbatore.
- 5) Vidyasekaran, P. 1993. Principles of Plant Pathology, CBS Publishers and Distributors, New Delhi.

AEG 127 : FARM MACHINERY FOR HORTICULTURAL CROPS 1+1

THEORY

Unit-I

Farm Power Power sources for horticulture, IC engines – working principles, two stroke and four stroke engines, different systems of an IC engine.

Unit-II

Orchard tractors – types, Selection of tractors and cost of tractor power – Tractor and implement selection for different horticultural operations.

Unit-III

Plant protection, harvesting and orchard management machinery Plant protection equipment for orchards.

Unit-IV

Harvesting tools and equipment. Harvesting machinery for vegetable and fruit crops, tuber crops, tree and plantation crops.

Unit V

Lawn management machinery – lawn mowers and machinery.

PRACTICAL

Study of different components of IC engine, four stroke petrol engine, two stroke petrol engine. Identification of components of MB plough, disc plough, seed planters, their working mechanisms. Operation of tractor and implements – operation and maintenance power tiller – Study of different inter – cultivation equipments – pruners – Sprayers and dusters – their operation, repairs and adjustment – Harvesting tools and harvesters for horticultural crops – Field capacity and cost analysis

Lecture Schedule

- 1) Farm power in India – human, animal, mechanical and electrical energy sources and their use in horticulture.
- 2) Two stroke and Four stroke engines, working principles, applications – types, power and efficiency.
- 3) Different systems of IC engine – cooling, lubricating, fuel injection systems.
- 4) Orchard tractors – types and utilities.
- 5) Tillage, objectives, types – Field capacity and field efficiency.
- 6) Primary tillage, objectives, mould board, disc plough, chisel plough and subsoiler, components and functions, types, advantages and disadvantages.
- 7) Secondary tillage equipment – harrows, land forming equipment – rotavators.
- 8) Sowing methods – seed planters – components and functions.

- 9) Mid Semester Examination.
- 10) Vegetable transplanters, types, working principle, field and nursery requirements – nursery equipment for seeding and nursery germination.
- 11) Implements for intercultural operations – cultivators, sweep, junior hoe, manual weeders and power operated weeders for orchards.
- 12) Sprayers and their functions, classification, manually operated sprayers, power sprayers – Dusters, types and uses.
- 13) Tools for horticultural crops – propagation tools, planters and harvesting tools and machinery – Powered garden tools for orchard management.
- 14) Harvesting machinery for vegetable, fruit crops and tuber crops – for tree and plantation crops.
- 15) Equipment for land development and soil conservation – dozers, levelers, bund former.
- 16) Cost of operation of farm machinery – problem solving.
- 17) Tractor and implement selection for different horticultural operations.

Practical Schedule

- 1) Study of working of two and four stroke petrol IC engine.
- 2) Identification of components of MB plough and disc plough, measurement of plough size, different parts, horizontal and vertical suction.
- 3) Identification of components of disc harrows, bund former, leveller and rotavator.
- 4) Identification of components of seed planters – furrow opener, metering mechanism and calibration.
- 5) Study of tractors – their operation and maintenance.
- 6) Learning to drive tractor.
- 7) Learning to operate tractor with mounted implement.
- 8) Identification of components of power tiller – their operation and maintenance.
- 9) Study of different inter – cultivation equipments such as power weeders and manually operated garden weeders.
- 10) Identification of components of plant protection equipment – power sprayers, knapsack sprayers, dusters – minor repairs and adjustment of sprayers.
- 11) Identification of components of vegetable transplanters – allied machinery for raising vegetable nursery.
- 12) Study of mowers – Registration and alignment of cutter bars – Rotary lawn mowers.
- 13) Tools for horticultural crops – propagation tools,pruners, planters and harvesting tools and machinery.
- 14) Turmeric, tapioca and potato harvesters. Study of hoists and tree management machinery.
- 15) Study of land development and soil conservation machinery – dozers, levelers, bund former and trenchers.
- 16) Problems on field capacity and cost of operation of farm machinery.
- 17) Orientation for final practical examination.

REFERENCES

- 1) Jagadishwar Sahay, 1992. Elements of Agricultural Engineering. Agro book agency, Patna – 20.
- 2) Michael and T.P.Ojha, 1996. Principles of Agricultural Engineering. Jain brothers, New Delhi.
- 3) Nakra C.P 1970. Farm Machinery and equipment, : Dhanpat Rai & Son
- 4) Bindra, O.S. and Harcharan Singh, 1971. Pesticide Application Equipment. Oxford and IBH pub Co., New Delhi.
- 5) Srivastava, A.C., 1990. Elements of Farm Machinery. Oxford IBH pub Co., New Delhi.

ENG 128 : ENGLISH LANGUAGE FOR EFFECTIVE COMMUNICATION (0+1)**Unit-I : Listening**

Introduction to Listening – listening vs. hearing – kinds of listening – Active listening – listening comprehension – note taking.

Unit-II : Speaking

Introduction to Speaking – Dialogue and Conversation – Principles of speech preparation – self introduction – short speech – welcome address – vote-of-thanks – telephonic conversation.

Unit-III : Reading

Introduction to reading – types of reading – skimming and scanning – idea reading (reading for information) – note – making – précis writing.

Unit-IV : Writing

Introduction to basic sentence structure – sentence completion – sentence correction – dialogue writing – paragraph writing – essay writing – letter writing.

Unit-V : Integrated Skills

Presentation skills – Group Discussion – Resume writing.

Practical Schedule

- 1) Introduction to listening – listening vs. hearing – kinds of listening.
- 2) Active listening – listening comprehension – note taking.
- 3) Introduction to speaking – Dialogue and Conversation – Principles of speech preparation.
- 4) Presentation skills – self introduction – short speech.
- 5) Welcome address – vote – of – thanks – telephonic conversation.
- 6) Introduction to reading – types of reading – skimming and scanning – idea reading (reading for information).
- 7) Note – making – précis writing.
- 8) Introduction to basic sentence structures.
- 9) Mid Semester Examination.
- 10) Sentence completion – Sentence correction.
- 11) Dialogue writing – paragraph writing.
- 12) Essay writing.

- 13) Letter writing – kinds of letter writing – writing letter to the editor.
- 14) Presentation skills
- 15) Group Discussion.
- 16) Resume writing.
- 17) Orientation for final examination.

Text Books

- 1) Hariharan, S. et al., *English for Effective Communication*. Coimbatore, Thannambikkai publications, 2014. Third edition.
- 2) Kepmer et al., *Writer1*, Wadsworth, Boston, USA.2012.

THIRD SEMESTER

HOR 211 : PRODUCTION TECHNOLOGY OF FLOWER CROPS (1 + 1)

Objectives

On completion of this course, the students will gain knowledge on cultivation techniques of commercial loose flowers in open field and cut flowers in protected structures.

THEORY

Unit-I : Principles of Growing Commercial Flowers

Scope and importance of commercial floriculture in India – distribution of important flower crops – area and production – export potential – international and national floral industry – cropping systems in flower crops – flower forcing – soil and climate – botany – species and varieties – propagation – principles and practices – planting systems and methods – pinching, training and pruning practices – nutrient and water management – role of growth regulators – intercultivation – harvest – yield and post harvest handling of the following loose flower crops: Rose, Jasmine, Chrysanthemum and Tuberose.

Unit-II : Production Technology of Loose Flowers

Crossandra, Marigold, Nerium and Gomphrena, Celosia and China aster.

Unit-III : Production Technology of Cut Flowers - I

Soil and climate – Botany – species and varieties – propagation – principles and practices – planting systems and methods – pinching, training and pruning practices – nutrient and water management – role of growth regulators – intercultivation – harvest – yield and post harvest handling of the following cut flower crops: cut roses, carnation, gerbera,

Unit-IV : Production Technology of Cut Flowers - II

Cut chrysanthemum and gladiolus.

Unit-V : Production Technology of Cut Flowers - III

Orchids and Anthurium.

PRACTICAL

Botany – description and identification of species and varieties in rose, jasmine, crossandra, chrysanthemum, tuberose, marigold, nerium, gomphrena, celosia, cut rose, carnation, gerbera, gladiolus, orchids and anthurium – propagation and planting – seed treatment and sowing – planting of tubers and

suckers – lay out and planting of rose and jasmine – media preparation and potting of orchids and anthurium – after culture practices in rose, jasmine, chrysanthemum and marigold – harvesting, postharvest handling and storage – extraction of floral concrete from rose, jasmine and tuberose – visit to commercial fields, extraction units and flower markets – working out benefit cost ratio for loose flowers and cut flowers – preparation of project reports for fresh flower production and floral concrete extraction.

Lecture Schedule

- 1) Scope and importance of commercial floriculture in India – area and production – export statistics.
- 2) Cropping systems in flower crops.
- 3) Cultivation aspects of Rose.
- 4) Cultivation aspects of Jasmine.
- 5) Cultivation aspects of Chrysanthemum.
- 6) Cultivation aspects of Tuberose.
- 7) Cultivation aspects of Crossandra and Marigold.
- 8) Cultivation aspects of Nerium and Gomphrena.
- 9) Mid Semester Examination.
- 10) Cultivation aspects of Celosia and China aster.
- 11) Cultivation aspects of Cut rose.
- 12) Cultivation aspects of Carnation.
- 13) Cultivation aspects of Gerbera.
- 14) Cultivation aspects of cut Chrysanthemum.
- 15) Cultivation aspects of Gladiolus.
- 16) Cultivation aspects of Orchids.
- 17) Cultivation aspects of Anthurium.

Practical Schedule

- 1) Identification and description of species and varieties – propagation and planting – special operations of the following crops: Rose.
- 2) Jasmine sp.
- 3) Tuberose and crossandra.
- 4) Chrysanthemum and marigold.
- 5) Nerium and gomphrena.
- 6) Celosia and china aster.
- 7) Preparation of project for loose flower production under open conditions.
- 8) Identification and description of species and varieties – media – planting – pruning and other important inter cultural practices of the following crops: Cut Rose.
- 9) Carnation and gerbera.
- 10) Cut chrysanthemum and gladiolus.
- 11) Anthurium and orchids.

- 12) Practices in postharvest management of cut flowers (precooling, grading, pulsing, storage, packaging and marketing of cut flowers).
- 13) Rose, jasmine and tuberose – extraction of floral concrete.
- 14) Working out input requirements and cost benefit ratio for loose and cut flowers.
- 15) Visit to flower growing areas, green house cultivation units and concrete & dye/pigment extraction units.
- 16) Preparation of project for cut flower production under controlled conditions.
- 17) Orientation for final practical examination.

REFERENCES

- 1) Arora.J.S.2013. Introductory Ornamental Horticulture. Kalyani publishers, Chennai.
- 2) Bhattacharjee.S.K and Lakshman Sharda De.2003. Advanced Commercial Floriculture. Aavishar publisher and Distributors, Jaipur.
- 3) Bose,T.K., Yadav L.P.,Pal.P,Parthasarathy, V.A and P. Das. 2003. Commercial Flowers – Vol.I and II Second revised edition. Naya Udyog, Kolkata.
- 4) Prasad, S. and U.Kumar, 2003. Commercial Floriculture. Agrobios, Jodhpur.
- 5) Reddy.S, Janakiram,B, Balaji.T. Kulkarni and R.L.Misra. 2007. High Tech Floriculture. Indian Society of Ornamental Horticulture, ICAR, New Delhi.
- 6) Vishnu Swarup. 1992. Ornamental Horticulture. Macmillan, India Ltd., New Delhi.

HOR 212 : PRODUCTION TECHNOLOGIES OF MEDICINAL AND AROMATIC PLANTS (1+1)

Objectives

At the end of this course, the students would be able to identify the medicinal and aromatic crops and state the medicinal properties and its cultivation techniques.

THEORY

Unit-I : Status and Scope of Medical and Aromatic Plants

Medicinal and aromatic plants – definitions, scope and importance. medicinal plant wealth of India and Tamil Nadu – area and production – classification – annual, biennial and herbaceous perennial. Medicinal and aromatic plants for tropical, sub – tropical and temperate regions.

Unit-II : Production Technology of Medicinal Plants – I

Soil and climatic – conditions, propagation and planting, manuring, irrigation, weed control, harvesting, yield, economic parts, post harvest handling, curing and processing practices, storage methods – contract farming and Good Agricultural Practices of the following medicinal plants:

Glory lily, Medicinal Coleus, Senna.

Unit-III : Production Technology of Medicinal Plants – II

Periwinkle, Gymnema, Ashwagandha, Phyllanthus, Kalmegh, Aloe vera and Stevia.

Unit-IV : Production Technology of Aromatic Plants – I

Japanese mint, Rosemary, Lemon grass, Citronella and Palmarosa.

Unit-V : Production Technology of Aromatic Plants – II

Vetiver, Geranium, Patchouli, Sacred Basil and Sweet Basil.

PRACTICAL

Identification and description of medicinal plants, parts used – nursery raising and planting – intercultural operations – harvest – processing – post harvest handling – cost of cultivation of the following medicinal plants: Glory lily, Medicinal Coleus, Senna, Periwinkle, Ashwagandha, Gymnema, Phyllanthus, Kalmegh, Aloe vera and Stevia. Identification and description of aromatic plants, parts used – nursery raising and planting – intercultural operations – harvest – post harvest handling and extraction of essential oil – cost of cultivation of the following aromatic plants: Japanese mint, Rosemary, Lemon grass, Citronella, Palmarosa, Vetiver, Geranium, Patchouli, Sacred Basil and Sweet Basil.

Lecture Schedule

- 1) Scope and importance of medicinal plants – classification of medicinal plants – annual, biennial and herbaceous perennial – medicinal plants for tropical, subtropical and temperate regions.
- 2) Production technology of Gloriosa and Medicinal Coleus.
- 3) Production technology of Senna and Periwinkle.
- 4) Production technology of Ashwagandha and Gymnema.
- 5) Production technology of Phyllanthus and Kalmegh.
- 6) Production technology of Aloe vera and Stevia.
- 7) Contract farming in medicinal plants.
- 8) Good Agricultural Practices for medicinal plants.
- 9) Mid Semester Examination.
- 10) Post harvest handling and processing methods.
- 11) Scope, importance of aromatic plants and classification of aromatic plants.
- 12) Production technology of Japanese mint and Rosemary.
- 13) Production technology of Lemon grass and Citronella.
- 14) Production technology of Palmarosa and Vetiver.
- 15) Production technology of Geranium and Patchouli.
- 16) Production technology of Sacred Basil and Sweet basil.
- 17) Processing and extraction technologies for aromatic crops.

Practical Schedule

- 1) Identification and description of medicinal plants and parts used.
- 2) Field preparation – propagation – intercultural operations – harvest indices – harvesting – processing – post harvest handling of the following crops :Glory lily.
- 3) Medicinal coleus.
- 4) Ashwagandha and senna.
- 5) Periwinkle, phyllanthus and kalmegh.

- 6) Aloevera.
- 7) Stevia.
- 8) Gymnema.
- 9) Identification of aromatic plants – parts used.
- 10) Field preparation – propagation – selection of planting material – intercultural operation – harvest indices – harvesting – post harvest handling – cost of cultivation of the following crops : palmarosa and lemon grass.
- 11) Citronella and vetiver.
- 12) Japanese mint and rosemary.
- 13) Geranium and patchouli.
- 14) Sacred basil and sweet basil.
- 15) Extraction of essential oils from aromatic plants and visit to essential oil extraction unit.
- 16) Visit to medicinal plant processing unit.
- 17) Orientation for final practical examination.

REFERENCES

- 1) Farooqi, A.A. and B.S. Sreeramu. 2004. Cultivation of Medicinal and Aromatic Crops. University Press, Hyderabad.
- 2) Kader Mohideen, M., Arumugam Shakila and A. Anburani. 2011. Production Technology of Medicinal and Aromatic Crops. Agrobios (India), Jodhpur.
- 3) Rajamani, K., S.Padmapriya, K.Kumanan, E.Vadivel and L.Pugalendhi 2009. Medicinal Plants Production – Towards Globalization.
- 4) Rajamani, K. and E.Vadivel. 2009. Naveena Moologai Sagupadi Thozhilnutpangal (Tamil).

HOR 213 : CROP PRODUCTION – II – FLOWER CROPS (0 + 2)

Objectives

This course is aimed at providing hands on training in the cultivation of flower crops. The student will be able to demonstrate the necessary knowledge, skill and attitude required for cultivation and marketing of flower crops.

PRACTICAL

Practical training and experience in production of commercial annual crops (marigold, celosia, gomphrena, etc.) – seed treatment – raising nursery – sowing seeds – field preparation – transplanting, basal manuring – irrigation – weed control – top dressing – after culture – growth regulators – plant protection – harvesting – maintenance of crop cultivation sheet – working out cost benefit ratio.

Practical Schedule

- 1) Practice in raising nursery for transplanted annual flowers.
- 2) Seed treatment and sowing of seeds in nursery.
- 3) Pest and disease management in nursery.
- 4) Field preparation – ploughing, formation of irrigation channels.
- 5) Practice in application of FYM and its incorporation in main field.

- 6) Formation of flat beds and channels.
- 7) Application of basal dressing of fertilizers.
- 8) Practice in transplanting of annual flower seedlings.
- 9) Practice in gap filling operation.
- 10) Practice in earthing up.
- 11) Practice in top dressing of fertilizers.
- 12) Practice in hand weeding.
- 13) Spray volume calculation and application of herbicides.
- 14) Recording observations on growth parameters.
- 15) Practice in foliar application of nutrients/growth regulators.
- 16) Practice in scheduling of irrigation.
- 17) Mid Semester Examination.
- 18) Practice in top dressing of fertilizers.
- 19) Practice in PGR preparation and application.
- 20) Practice in special horticultural practices for flower crops.
- 21) Identification of different nutrient deficiency symptoms and their management.
- 22) Identification of important pests and their management.
- 23) Spray volume calculation and application of pesticides.
- 24) Identification of important diseases and their management.
- 25) Spray volume calculation and application of fungicides.
- 26) Recording observations on yield parameters.
- 27) Practice in harvesting.
- 28) Practice in seed extraction.
- 29) Practice in processing of seeds.
- 30) Practice in packaging of flowers and seeds.
- 31) Cost economics of production.
- 32) Visit to fields growing commercial flower crops.
- 33) Visit to flower markets.
- 34) Orientation for final practical examination.

REFERENCES

- 1) Arora, J.S. 1999. Introduction to Ornamental Horticulture. Kalyani Publishers, Ludhiana. India.
- 2) Battacharjee, S.K. and L.C. De. 2003. Advanced Commercial Floriculture (Vol. I&II), Aavishkar Publishers and Distributors, Jaipur.
- 3) Bose, T.K., LP. Yadav, P. Pal, P. Das. and V.A. Parthasarathy. 2002. Commercial Flowers (Vol. I&II), Naya Prokash, Kolkatta.
- 4) Kumar, N. 1998. Introduction to Horticulture (Revised sixth Edition) Rajalakshmi Publication, Nagercoil.
- 5) Lourie, A. and V.H. Ries, 2004. Floriculture – Fundamentals and Practices, Agrobios (India) Jodhpur.

HOR 214 : SILVI HORTICULTURE (1+1)**Objectives**

To impart knowledge about importance of growing tree species as livelihood for village communities, establishing tree nurseries, care and growing of tree species.

THEORY**Unit-I : Forest and its Importance**

Role of forests – status of forests – global forest scenario – Indian forests – National Forest Policy, 1988.

Unit-II : Social Forestry and its Concepts

Social forestry – concept – definition – objectives – components – social forestry projects in Tamil nadu – interface forestry – joint forest management (JFM) – Tamil Nadu Afforestation Project (TAP)

Unit-III : Agro Forestry and their Classification

Agroforestry – definition – concept – benefits – constraints – criteria for selection of tree species for agroforestry – classification – primary systems – sub systems – industrial agroforestry – role of agroforestry in soil and water conservation.

Unit-IV : Management of Tree Species

Silviculture of important agroforestry species viz., cashew, casuarina, eucalyptus, tamarind, pungam, neem, jamun, ber, silk cotton and palmyrah.

Unit-V : Waste Land and Afforestation

Wastelands – definition – classification and extent – suitable tree species for different types of problem soils and wastelands – planting techniques for wastelands – afforestation in difficult sites.

PRACTICAL

Identification of trees – seeds and seedlings of important agroforestry species – forest nursery – types – layout – bed preparation – nursery technology of important tree species – forest mensuration – visit and study of different agroforestry systems – economics – visit to social forestry plantations – TAP – hillock afforestation site – assessing fodder and fuel requirements of a village – assessing people's involvement in forest based activities.

Lecture Schedule

- 1) Role of forest – Status of forests Global and Indian forest status – National Forest .
- 2) National forest policy.
- 3) Social forestry – definition – objectives – components.
- 4) Social forestry projects – Phase I & II – targets and achievements.
- 5) Joint forest management – Tamilnadu afforestation programme.
- 6) Agroforestry – definition – components – different terminologies – distinction between agroforestry and social forestry.
- 7) Benefits of agroforestry systems – increased food production – improvement of soil fertility and soil conservation – Classification of agroforestry systems.
- 8) Role of agroforestry in soil and water conservation.

- 9) Mid Semester Examination.
- 10) Shelter belts – differences, importance – design of shelter belts and species composition.
- 11) Role of agroforestry in soil, water and ecological conservation – industrial agroforestry – constraints in agroforestry.
- 12) Silvi culture of important agroforesting species.
- 13) Silvi culture practices for casuarina – eucalyptus, cashew, ber.
- 14) Silvi culture practices for tamarind – neem, jamun.
- 15) Silvi culture practices for pungam, silkcotton, palmyrah.
- 16) Wasteland – definition – classifications – suitable tree species.
- 17) Suitable agroforestry systems for different problem soils and wastelands.
- 18) Planting techniques and afforestation for wastelands.

Practical Schedule

- 1) Identification and description of seeds and seedlings of tree species cashew – ber – casuarina, eucalyptus – neem – silkcotton.
- 2) Identification and description of seeds and seedlings of tamarind, pungam, neem, jamun, palmyrah.
- 3) Production of pre – sprouted seeds in tamarind, cashew, palmyrah by different seed treatment methods.
- 4) Production of pre – sprouted seeds in neem and silk cotton by different seed treatment methods.
- 5) Identification and description of fuel, fodder, and green manure trees in the locality.
- 6) Nursery methods for eucalyptus and casuarinas.
- 7) Production of seedlings in polybags for avenue planting.
- 8) Measurement of light transmission ratio – soil temperature – air temperature under few tree species in relation to open conditions.
- 9) Visit to woodlots of casuarina, eucalyptus, neem, tamarind and observing spacing, height, girth and calculating tree volume.
- 10) Visit to agroforestry systems in farmers holdings and recording the spacing and assessing the growth and yield.
- 11) Working out economics of cultivation of tree species like casuarina and eucalyptus.
- 12) Visit to social forestry plantations and identification of tree species – recording espacement and purpose.
- 13) Assessing the problem soils – identifying suitable tree species, recording espacement and purpose.
- 14) Visit to afforestation in difficult sites.
- 15) Visit to avenue plantation, identification of tree species – description of the trees and spacing adopted.
- 16) Visit to nearby villages and assessing the needs of fodder, fuel and green manure.
- 17) Orientation for final Practical Examination.

REFERENCES

- 1) Dwivedi, A.P. A Textbook of Silviculture. International Book Distributors, Dehradun.
- 2) Gupta, R.K. 1993. Multipurpose Trees for Agroforestry and Wasteland Utilization Oxford and IBH Publishing Co., New Delhi.
- 3) Mukul Kumar. 2016. Forest Management in Agriculture, Horticulture and Forestry. Century Press
- 4) Nair, P.K.R. 1993. Introduction to Agroforestry. Kluwer Academic Publishers, Dordrecht. The Netherlands.
- 5) Negi.S.S.1986. A Hand book of Social Forestry. International book Distributors, Dehradun.
- 6) Nyland, R.D. 2002. Silviculture : Concepts and Applications. Waveland Press, Long Grove, IL.
- 7) Prasad,V.N.1985. Principles and Practices of Social cum Community Forestry. International book Distributors, Dehradun.

HOR 215 : PRODUCTION TECHNOLOGIES OF SPICES AND PLANTATION CROPS (1+1)

Objectives

This course shall provide knowledge and skill required for cultivation and management of major spices and plantation crops.

THEORY

Unit-I : Importance of Spices and Plantation Crops

Scope and importance of spices and plantation crops – area – production and productivity – global and national scenario.

Unit-II : Production technology of Spices – I

Study of cultural operations for the following spices and plantation crops with reference to soil, climate, varieties, propagation, cultural practices – training and pruning – harvesting – yield – postharvest handling: processing – grading and packing – GAP in spices and plantation crops production.

Pepper, cardamom and turmeric, ginger.

Unit-III : Production Technology of Spices – II

Clove, nutmeg and cinnamon.

Unit-IV : Production Technology of Plantation Crops – I

Tea, coffee and rubber.

Unit-V : Production technology of Plantation Crops – II

Cocoa, cashew, coconut and arecanut.

PRACTICAL

Identification of different spices and plantation crops and value added products – propagation techniques – selection of planting material – sowing – important cultural practices – post harvest handling of the following spices and plantation crops: Pepper, Cardamom, Turmeric, Ginger, Clove, Nutmeg, Cinnamon, Tea, Coffee, Cocoa, Rubber, Arecanut, Cashew and Coconut – visit to various spices and plantation crops growing areas and industries.

Lecture Schedule

- 1) Scope and importance of spices – area – production and productivity.
- 2) Cultural practices of Pepper.
- 3) Cultural practices of Cardamom.
- 4) Cultural practices of Turmeric.
- 5) Cultural practices of Ginger.
- 6) Cultural practices of Clove.
- 7) Cultural practices of Nutmeg.
- 8) Cultural practices of Cinnamon.
- 9) Mid Semester Examination.
- 10) Scope and importance of plantation crops – area – production and productivity.
- 11) Production technology of Tea.
- 12) Production technology of Coffee.
- 13) Production technology of Rubber.
- 14) Production technology of Cocoa.
- 15) Production technology of Cashew.
- 16) Production technology of Arecanut.
- 17) Production technology of Coconut.

Practical Schedule

- 1) Identification and description of different spice crops.
- 2) Rapid multiplication techniques in pepper and cardamom.
- 3) Processing of pepper and cardamom.
- 4) Processing of turmeric and ginger.
- 5) Softwood grafting and top working in nutmeg.
- 6) Harvest and post harvest practices in cinnamon.
- 7) Identification and description of different plantation crops
- 8) Nursery practices and training and pruning in tea.
- 9) Processing of tea.
- 10) Nursery practices and training and pruning in coffee.
- 11) Processing of coffee.
- 12) Nursery practices and tapping methods in rubber.
- 13) Processing of rubber.
- 14) Nursery practices and processing of cocoa.
- 15) Soft wood grafting, high density planting and top working in cashew
- 16) Selection of mother palm and seed nuts in coconut.
- 17) Orientation for final examination.

REFERENCES

- 1) Arumugam Shakila and A. Anburani. 2013. Production Technology of Spices. Agrobios (India), Jodhpur.
- 2) Kumar, N. Md. Abdul Khader, P.Rangasamy, and I. Irulappan, 2001. Spices, Plantation Crops, Medicinal and Aromatic Plants, Rajalakshmi Publications, Nagercoil.
- 3) Shanmugavelu, K.G., N. Kumar and K.V. Peter. 2005. Production Technology of Spices and Plantation Crops. Agrobios, Jodhpur.

AEN 216 : PESTS OF HORTICULTURAL CROPS AND THEIR MANAGEMENT (1+2)

Objective

To impart knowledge on distribution, bionomics, symptoms of damage and management strategies of Insects, Mites and Nematode pests of horticultural crops.

THEORY

Integrated Pest Management strategies for important insects, mites and nematode pests of following crops.

Unit-I : Pests of Vegetable and Tuber Crops

Brinjal, Bhendi, Tomato, Crucifers, Cucurbits, Carrot, Beet root, Radish, Turnip, Beans, Chillies, Onion, Garlic, Moringa, Amaranthus, Potato, Sweet potato, Tapioca, Yam and Colocasia.

Unit-II : Pests of Tropical Fruit Crops

Mango, Citrus, Guava, Banana, Grapevine, Ber, Sapota, Papaya, Avocado, Mangosteen, Durian, Fig, Hill banana; Pomegranate, Aonla, Pine apple, Custard apple, Wood apple, Jamun, Jack, Bread fruit, Passion fruit and Litchi.

Unit-III : Pests of Temperate Fruit Crops

Apple, Pear, Peach, Plum, Strawberry, Kiwi, Sweet and Sour cherry, Apricot, Raspberry, Persimmon and Currants.

Unit-IV : Pests of Plantation and Spice Crops

Coconut, Arecanut, Palmyrah, Tea, Coffee, Cashew, Cocoa, Rubber, Ginger, Turmeric, Cardamom, Pepper, Fennel, Cumin, Fenugreek, Clove, Nutmeg, Cinnamon, Coriander, Curry leaf, Asafoetida, Vanilla, Betelvine and Tamarind.

Unit-V : Pests of Flower Crops, Medicinal Plants, Lawn and Stored products

Rose, Jasmine, Crossandra, Chrysanthemum, Tuberose, Cut flowers, Gloriosa, Coleus, Phyllanthus, Aswagantha, Vasaka, Senna, Periwinkle, Ocimum, Mint, Lemon grass, Citronella, Vetiver, Lawn and Stored product
Special pest management strategies in green house, poly house. Management techniques for plant parasitic nematodes.

PRACTICAL

Identification of symptoms of damage and life stages of important Insects, Mites and Nematode pests of different horticultural crops: vegetables, tubers, tropical fruits, temperate fruits, plantation crops, spices, flower crops, medicinal plants, lawn and stored products. Non – insect pests – study of important rodents, mites and plant parasitic nematodes of horticultural crops. Sample collection and extraction methodologies for plant parasitic nematodes.

Assignments: Each student has to collect and rear 15 immature stages of important insect pests injurious to horticultural crops and also 50 adult insects affecting horticultural crops.

Theory Lecture Schedule

Integrated Management strategies for the following pests.

- 1) Pests of Brinjal, Bhendi and Tomato.
- 2) Pests of Crucifers, Cucurbits, Carrot, Beet root, Radish, Turnip, Beans, Chillies, Onion and Garlic.

- 3) Pests of Moringa and Amaranthus; Potato, Sweet potato, Tapioca, Yam and Colocasia.
- 4) Pests of Mango, Citrus, Banana, Guava, Grapevine and Ber.
- 5) Pests of Sapota, Papaya, Avocado, Mangosteen, durian, Fig and Hill banana.
- 6) Pests of Pomegranate, Aonla, Pine apple, Custard apple, Wood apple and Jamun.
- 7) Pests of Jack, Bread fruit, Passion fruit and Litchi.
- 8) Pests of Apple, Pear, Peach, Plum, Strawberry, Kiwi, Sweet and Sour cherry and Apricot, Raspberry, Persimmon and Currants.
- 9) Mid Semester Examination.
- 10) Pests of Coconut, Arecanut and Palmyrah.
- 11) Pests of Tea, Coffee, Cashew, Cocoa and Rubber.
- 12) Pests of Ginger, Turmeric, Cardamom, Pepper and Fennel.
- 13) Pests of Cumin, Fenugreek, Clove, Nutmeg, Cinnamon, Coriander, Curry leaf, Asafoetida, Vanilla, Betelvine and Tamarind.
- 14) Pests of Rose, Jasmine, Crossandra, Chrysanthemum, Tuberose and Cut flowers.
- 15) Pests of Gloriosa, Coleus and Phyllanthus, Aswagantha, Vasaka, Senna, Periwinkle, Ocimum, Mint, Lemon grass, Citronella, Vetiver and Lawn.
- 16) Pests of Stored products.
- 17) Management of plant parasitic nematodes and other non-insect pests.

Practical Schedule

Identification and integrated management of insect pests of the following crops:

- 1) Pests of Brinjal, Bhendi and Tomato.
- 2) Pests of Crucifers and Cucurbits.
- 3) Pests of Chow Chow, Carrot, Beet root, Radish, Turnip, Beans and Palak.
- 4) Pests of Chillies, Onion, Garlic, Moringa and Amaranthus.
- 5) Pests of Potato, Sweet potato, Tapioca, Yam and Colocasia.
- 6) Pests of Mango, Citrus and Banana.
- 7) Pests of Guava, Grapevine and Ber.
- 8) Pests of Sapota, Papaya and Avocado.
- 9) Pests of Mangosteen, Durian, Fig and Hill banana.
- 10) Pests of Pomegranate, Aonla, Pine apple, Custard apple, Wood apple and Jamun.
- 11) Pests of Jack, Bread fruit, Passion fruit and Litchi.
- 12) Pests of Apple, Pear, Peach, Plum, Strawberry and Kiwi.
- 13) Pests of Sweet and Sour cherry, Apricot, Raspberry, Persimmon and Currants.
- 14) Pests of Coconut, Arecanut and Palmyrah.
- 15) Pests of Tea, Coffee, Cashew, Cocoa and Rubber.
- 16) Pests of Ginger, Turmeric, Cardamom.
- 17) Pests of Pepper, Fennel, Cumin, Fenugreek, Clove, Nutmeg, Cinnamon.
- 18) Pests of Coriander, Curry leaf, Asafoetida, Vanilla, Betelvine and Tamarind.
- 19) Pests of Rose, Jasmine and Crossandra, Chrysanthemum, Tuberose.

- 20) Pests of Cut flowers.
- 21) Pests of Gloriosa, Coleus and Phyllanthus.
- 22) Pests of Aswagantha, Vasaka and Senna.
- 23) Pests of Periwinkle, Ocimum and Mint.
- 24) Pests of Lemon grass, Citronella, Vetiver and Lawn.
- 25) Pests of lawn and their management.
- 26) Pests in greenhouses or polyhouses and their management.
- 27) Insect pests of stored horticulture products and their management.
- 28) Mite pests of horticultural crops and their management.
- 29) Rodent pests of horticultural crops and their management.
- 30) Extraction of nematodes from soil and plant samples.
- 31) Feeding habits and life cycle of Root knot, Cyst, Reni form, and Lesion nematode.
- 32) Nematode pests of fruit crops (Banana, Papaya, Grape vine and Citrus) and plantation crops (Coconut, Arecanut, Tea, Coffee and Cardamom) and their management.
- 33) Nematode pests of vegetable crops (Tomato, Bhendi, Brinjal, Carrot, Cucurbits, Beans, Potato, Beet root) and flowers (Tuberose, Crosandra, Carnation, Gerbera) and their management.
- 34) Orientation for final practical examination.

REFERENCES

- 1) Muthukrishnan, N., N.Ganapathy, R.Nalini and R.Rajendran. 2005. *Pest Management in Horticultural Crops*. New Madura Publishers, Madurai. 325 p.
- 2) Nair, M.R.G.K. 1986. *Insects and Mites of Crops in India*. Publications and Information Division, ICAR, NewDelhi. 408 p.
- 3) Parvatha Reddy. 2010. *Insect, Mite and Vertebrate Pests and their Management in Horticultural Crops*. Scientific Publishers, Jodhpur. 384 p.
- 4) David, B.V. and V.V.Ramamurthy. 2017. *Elements of Economic Entomology*. 8th Edition, Brillion Publishing, New Delhi. 398 p.
- 5) Butani, D.K. and M.G.Jotwani. 2013. *Insects in Vegetables*. Daya Publishing House, NewDelhi. 356 p.

PAT 217 : DISEASES OF HORTICULTURAL CROPS AND THEIR MANAGEMENT (1+2)

Objectives

The subject covers etiology, symptoms, epidemiology, mode of spread, survival and integrated management of important diseases in horticultural crops due to fungi, bacteria, viruses, phytoplasma, phanerogamic parasites and non – parasitic causes and Edible mushroom production.

THEORY

Unit-I

Fruit Crops – Mango, Banana, Citrus, Grapevine, Guava, Sapota, Pomegranate, Papaya, Jack, Pineapple, Ber, Apple, Pear and Plum.

Unit-II

Vegetable Crops – Brinjal, Tomato, Bhendi, Cucurbits, Crucifers, Beans, Peas, Potato, Sweet potato, Yam, Radish and Cassava.

Unit-III

Edible Mushroom – Cultivation techniques of Pleurotus, Calocybe and Agaricus

Unit-IV

Spices and Condiments – Onion, Garlic, Chillies, Cardamom, Pepper, Turmeric, Ginger, Betelvine, Coriander, Fenugreek, Clove and Nutmeg. Plantation crops – Tea, Coffee, Cocoa, Rubber, Coconut, Arecanut and Cashew.

Unit-V

Flower crops – Jasmine, Rose, Crossandra, Chrysanthemum, Tuberose, Carnation and Marigold – Medicinal plants – Gloriosa, Stevia, Senna, Coleus, Aloevera, Solanum nigrum and Withania.

PRACTICAL

Identification, Etiology, symptoms, Mode of spread, survival and management of important diseases in major Fruits, Vegetables, Plantation crops, Spices and Condiments, Flowers and Medicinal plants. Cultivation techniques for mushroom. Collection and preservation of plant diseased specimens.

(Students should submit 50 preserved diseases specimens).

Theory Schedule

- 1) Mango and Banana.
- 2) Citrus and Grapesvine.
- 3) Guava, Sapota, Pomegranate.
- 4) Jack, Papaya, Pineapple and Ber.
- 5) Apple, Pear and Plum, Peach.
- 6) Tomato and Brinjal.
- 7) Cucurbits and Crucifers.
- 8) Potato, Sweet potato and Cassava.
- 9) Mid Semester Examination.
- 10) Yam, Bean and Peas.
- 11) Mushroom cultivation: Calocybe, Pleurotus and Agaricus.
- 12) Onion, Garlic and Chillies and Betelvine.
- 13) Turmeric, Ginger, Cardamom, Coriander, Clove and Nutmeg.
- 14) Tea, Coffee and Rubber.
- 15) Coconut, Arecanut and Cashew.
- 16) Rose, Jasmine, Crossandra, Chrysanthemum, Gerbera, Tuberose, Marigold and Carnation.
- 17) Post harvest diseases of major horticultural crops.

Practical Schedule

- 1) Diseases of Mango.
- 2) Diseases of Banana.
- 3) Diseases of Citrus and Grapevine.

- 4) Diseases of Guava, Sapota, Pomegranate and Jack.
- 5) Diseases of Papaya, Pineapple and Ber.
- 6) Diseases of Apple Pear and Plum, peach
- 7) Diseases of Post harvest diseases – Apple, Mango, Banana, Citrus, Papaya and Grapevine.
- 8) Diseases of Brinjal and Bhendi.
- 9) Diseases of Tomato.
- 10) Diseases of Cucurbits.
- 11) Diseases of Cabbage, Cauliflower and Radish.
- 12) Diseases of Potato.
- 13) Diseases of Sweet potato and Cassava.
- 14) Diseases of Yam, Bean and Peas.
- 15) Mushroom cultivation : *Agaricus*.
- 16) Mushroom cultivation : *Pleurotus*.
- 17) Mushroom cultivation : *Calocybe*.
- 18) Biotic and abiotic stresses of mushroom.
- 19) Diseases of Chillies.
- 20) Diseases of Onion and Garlic.
- 21) Diseases of Pepper and Betelvine.
- 22) Diseases of Turmeric and Ginger.
- 23) Diseases of Clove, Nutmeg, Fenugreek and Coriander.
- 24) Diseases of Tea and Coffee.
- 25) Diseases of Coconut and Arecanut.
- 26) Diseases of Rubber.
- 27) Diseases of Cocoa and Cardamom.
- 28) Diseases of Jasmine and Rose.
- 29) Diseases of Crossandra, Chrysanthemum, Marigold, Tuberose and Carnation.
- 30) Diseases of Gloriosa, Stevia, Senna and Withania.
- 31) Diseases of Coleus, Aloe vera and *Solanum nigrum*.
- 32) Diseases of Horticultural crops under protected cultivation.
- 33) Field visit.
- 34) Orientation for final practical Examination.

REFERENCES

- 1) Agrios, G.N. 2005. Plant Pathology, Academic Press, New York.
- 2) Alfred Steferud, 2005, Diseases of Vegetable Crops, Biotech Books, New Delhi.
- 3) Alfred Steferud. 2005. Diseases of Plantation Crops, Biotech Books, New Delhi.
- 4) Henry, L.D.C. and Lewin, H. 2011. Crop Diseases – Identification, Treatment and Management, New India Publishing Agencies, New Delhi.
- 5) Rangaswami, G and Mahadran, A. 2005. Diseases of crop plants in India. Prentice Hall of India Pvt. Ltd., New Delhi.

AHS 218 : FUNDAMENTALS OF LIVESTOCK AND POULTRY MANAGEMENT (1+1)

Objective

To provide hands on training about livestock and poultry management and thereby enabling to apply their technical knowledge at field level. To impart latest technology of livestock industries so as to infuse entrepreneurial attitude among the students.

THEORY

Unit-I : Introduction

Significance of livestock and poultry in Indian economy – Common nomenclatures – Various systems of livestock production – extensive, semi intensive, intensive systems of farming.

Unit-II : Dairy Management – I

Important breeds of cattle and buffaloes – Basics of oestrous cycle and Artificial Insemination – Housing management – Systems of housing – Care and management of young and adult stock.

Unit-III : Dairy management – II

Clean milk production – Nutrition – Ration – Balanced ration – Classification of feed stuff – Prevention and control measures of diseases.

Unit-IV : Sheep and Goat management

Important breeds of sheep and goat – Systems of rearing – Care and management of young and adult stock – Steaming up – Flushing – Prevention and control measures of diseases.

Unit-V : Poultry Management

Important commercial layer and broiler strains – System of housing – Cage and deep litter – Broiler and layer management – Litter management – Feed requirement – Feed conversion ratio – Prevention and control measures of diseases.

PRACTICAL

External parts of Cattle – Identification methods of Livestock – Common restraining methods of livestock – Disbudding and deworming – Determination of age in cattle – Study and design of cattle shed – Detection of Estrum in cows – Demonstration of Artificial Insemination – Determination of specific gravity of milk – Identification of feed and fodder – Economics of broiler farming – Preparation of brooder house – Identification of poultry farm equipments – Vaccination schedule for broilers and layers – Demonstration of dressing of chicken – Visit to poultry farm.

Lecture Schedule

- 1) Significance of livestock and poultry in Indian economy – Common nomenclatures used in Animal Husbandry.
- 2) Various systems of livestock production – extensive – semi intensive – intensive systems of farming.
- 3) Important breeds of cattle – Red Sindhi, Kangeyam, Umblacherry, Jersey and Holstein Friesian – Buffalo breeds – Murrah and Surti.
- 4) Basics of oestrus cycle and Artificial Insemination.
- 5) Systems of housing – Single row system – Double row system – Head to Head and Tail to Tail – merits and demerits.

- 6) Care and management of new born calf, heifers, pregnant and lactating animals.
- 7) Clean milk production.
- 8) Nutrition – Ration – Balanced ration – Classification of feed stuff – Prevention and control measures of diseases.
- 9) Mid Semester Examination.
- 10) Introduction – Important breeds of sheep and goat – Systems of rearing.
- 11) Care and management of young and adult stock.
- 12) Steaming up – Flushing – Prevention and control measures of diseases.
- 13) Introduction – Important commercial layer and broiler strains.
- 14) Systems of Housing – Deep litter and cage systems.
- 15) Brooder management – Broiler and layer management.
- 16) Litter management.
- 17) Feed requirement – Feed conversion ratio – Prevention and control measures of diseases.

Practical Schedule

- 1) External parts of Cattle.
- 2) Identification methods of Livestock.
- 3) Common restraining methods of cattle.
- 4) Disbudding and deworming.
- 5) Determination of age in cattle.
- 6) Study and design of cattle shed.
- 7) Detection of Estrum in cows.
- 8) Demonstration of Artificial Insemination in cows.
- 9) Determination of specific gravity of milk.
- 10) Identification of feed and fodder.
- 11) Economics of broiler farming.
- 12) Preparation of brooder house.
- 13) Identification of poultry farm equipments.
- 14) Vaccination schedule for broilers and layers.
- 15) Demonstration of dressing of chicken.
- 16) Visit to poultry farm.
- 17) Orientation for final practical examination.

Text Books

- 1) Banerjee, G.C. 2010. The Text Book of Animal Husbandry. Oxford Book Company, Calcutta.
- 2) Dairy India Year Book 2007. A – 25, Priyadarshini Vihar, Delhi.
- 3) ICAR, 2010. A Hand Book of Animal Husbandry.
- 4) Jull, M.A. 2003. Successful Poultry Management.
- 5) Kadirvel, R., and Balakrishnan, V., 1998. Hand Book of Poultry Nutrition. Madras Veterinary College, TANUVAS., Chennai.
- 6) Prabakaran, R., 1998. Commercial Chicken Production. Publisher P.Saranya, 5/2, Ramalingam Street, Seven Wells, Chennai.

- 7) Sastry, N.S.R., Thomas, C.K. and Singh, R.A. 1982. Farm Animal Management and Poultry Production. Vikas Publishing House Private Limited, Ghaziabad, UP.
- 8) Sastry, N.S.R., Thomas, C.K. 2005. Livestock Production Management. Kalyani Publishers, Ludhiana.
- 9) Watson, J.A.S. and Mills, W.J. 2005. Farm animals and their Management.

FOURTH SEMESTER

HOR 221 : PROTECTED CULTIVATION (1+1)

Objectives

Understanding the principles, theoretical aspects and developing skills in protected cultivation and precision farming of horticultural crops.

THEORY

Unit-I : Importance and Basics of Protected Cultivation

Protected cultivation – overview – importance – scope and current status of protected cultivation of horticultural crops in India – modes of protected cultivation – classification of greenhouses – basic considerations in establishment and operation of green houses – greenhouse construction and covering materials.

Unit-II : Environmental Control and Nutrient Management

Environmental control systems in greenhouse – ventilation – heating and cooling systems – lighting – carbon dioxide enrichment – Hi – tech nursery management – bed preparation – media and sterilization – planting methods – water and nutrient management – greenhouse irrigation systems – fertigation – hydroponic systems.

Unit-III : Precision Horticulture

Precision horticulture – principles and concepts – enabling technologies of precision farming – GPS, GIS, Remote sensing – sensors – variability management in precision farming – mapping – variable rate technology (VRT) – precision equipments – computers and robotics in precision farming.

Unit-IV : Protected Cultivation of Cut Flowers

Crop regulation – special horticultural practices under protected cultivation of rose, chrysanthemum, carnation, orchids, anthurium, gerbera and liliun – harvest indices – post – harvest handling.

Unit-V : Protected Cultivation of Vegetables

Protected technology for raising tomato, sweet pepper, cucumber and other vegetables in protected structures – harvest indices – post – harvest handling.

PRACTICAL

Growing structures – basic considerations in establishment and operation of greenhouses – Hi – tech nursery – environmental control systems in greenhouse – containers – substrate culture – soil decontamination techniques – scheduling irrigation and fertigation for horticultural crops – crop regulation – special horticultural practices under protected cultivation – Visit to protected cultivation unit, auction centre and cold storage Unit–precision equipments – computers and robotics in precision farming – post – harvest process management in floriculture using precision farming.

Lecture Schedule

- 1) Protected cultivation – introduction – Scope and current status of protected cultivation in India.
- 2 & 3) Classification of greenhouses – based on shape, utility, construction materials, covering materials etc.,
- 4 & 5) Environment control – ventilation – heating and cooling systems – lighting – carbon dioxide enrichment.
- 6) Hi-tech nursery management – bed preparation – media and sterilization – planting methods.
- 7) Water and nutrient management – greenhouse irrigation systems.
- 8) Fertigation.
- 9) Mid Semester Examination.
- 10) Hydroponic systems – methods, scope and advantages.
- 11) Precision horticulture – Principles and concepts.
- 12) Enabling technologies of precision farming – GPS, GIS, Remote sensing – sensors.
- 13) Variability management in precision farming – mapping – variable rate technology.
- 14) Special horticultural practices under protected cultivation of flower crops – rose, chrysanthemum, carnation.
- 15) Orchids, anthurium, gerbera and liliium.
- 16) Special horticultural practices under protected cultivation of tomato.
- 17) Special practices under protected cultivation of Sweet pepper and cucumber.

Practical Schedule

- 1) Study of various modes of protected cultivation.
- 2) Components of polyhouse and structural designs and styles.
- 3) Study and design of greenhouse covering materials.
- 4) Raising hi – tech nursery and its management.
- 5) Selection and sterilization of media for hi-tech culture.
- 6) Designing and operating of environmental control systems.
- 7) Bed preparation inside protected structure.
- 8) Scheduling irrigation and fertigation for horticultural crops.
- 9) Special cultural operations in flower crops.
- 10) Special cultural operations in vegetable crops.
- 11) Working out cost of production of flower crops under protected condition.
- 12) Working out cost of production of vegetable crops under protected condition.
- 13) Visit to protected cultivation units – auction centre – cold storage units.
- 14) Export documentation and procedure.
- 15) Operating of precision equipments.
- 16) Computers and robotics in precision farming and post-harvest process management in floriculture using precision farming.
- 17) Orientation for final Practical Examination.

REFERENCES

- 1) Acharya, S.K. A.B. Sharangi and M.K. Pandit.2012. Precision Horticulture. Agrotech Publishing Academy.
- 2) Jiter Singh, S.K. Jain and L.K. Dashora. 2010. Precision Farming in Horticulture. New India Publishing Agency.
- 3) Prasad.S and U. Kumar.2005. Green house management for horticulture crops.2nd Edn Agrobios, Jodhpur.
- 4) Preethi, TI , P. Aruna and S. Muthu Kumar. 2012. Protected Horticulture. Narendra Publishing House.
- 5) Reddy S, B.Janakiram, Balaji T. Kulkarni and R.L.Misra. 2007. High – tech Floriculture. Indian Society of Ornamental Horticulture, New Delhi.
- 6) Sandhya Sharaf. 2012. Green House Management of Horticulture Crops. Oxford Book Company.
- 7) Singh, D.K. and K.V. Peter.2014. Protected Cultivation of Horticultural Crops. New India Publishing Agency.
- 8) Tiwari.G.N. 2003. Green house Technology for controlled environment. Narosa Public house.

HOR 222 : STUDY TOUR (0+1)

Visit to places of commercial cultivation of vegetable crops, flower crops, spices and plantation crops (other than coffee and tea) – study of cropping systems – varieties – adoption of scientific crop production technology – constraints in production – marketing – economic analysis. (10 days).

HOR 223 : PRACTICAL TRAINING IN HILL HORTICULTURAL CROPS (0+2)

Exposure visits to study about temperate and subtropical horticultural crops – visit to estates, factories, auction centres and blending units. Project preparation for the establishment of estates (10 days).

HOR 224 : POST HARVEST HANDLING AND VALUE ADDITION OF HORTICULTURAL CROPS (2+1)

Objectives

To highlight the importance of post – harvest technology in sustainable horticulture and to impart knowledge on various pre – harvest and post – harvest factors, various types of losses and value addition techniques.

THEORY

Unit-I : Principles of Post – Harvest Technology

Importance and scope of post – harvest technology and causes of post – harvest losses – maturity indices and time of harvesting – pre and post – harvest physiological changes in horticultural produce – pre harvest factors influencing post – harvest life – pre harvest and post – harvest treatments to enhance shelf life.

Unit-II : Post Harvest Treatments and Storage

Handling methods – pre – cooling – cooling methods – washing and grading – waxing – vapour heat treatment – fumigation – ripening methods – ethylene in post – harvest technology. storage methods – low temperature storage – refrigerated

storage – storage using evaporative coolers – hypobaric, controlled and modified atmospheric storage techniques – storage disorders – handling of cut flowers – shelf life extension.

Unit-III : Packaging and Export of Horticultural Produce

Packaging of horticultural produce – type of containers and cushioning materials – methods of packing – controlled and modified atmospheric packaging – vacuum packing, edible packaging. WTO guidelines for export of horticultural produce – CODEX standards and export standards for major fruits, vegetables and cut flowers – food safety standards.

Unit-IV : Methods of Preservation

Status and scope of fruit and vegetable processing industries in India – Principles of preservation – preservation with sugar, salt – chemicals or bio – preservatives – drying and dehydration – types of driers – canning – preparation of canned products and fermented beverages.

Unit-V : Recent Technologies in Fruit and Vegetable Processing

Minimal processing of fruits and vegetables – techniques involved – recent trends in processing – processing by irradiation – principles, methods, suitability – application of irradiation in food processing – waste and by – product utilization from processing industry.

PRACTICAL

Practice in judging the maturity of various horticultural crops – studies on harvesting or delaying ripening of treated produce – types of packaging materials and packaging methods – equipments in food processing Unit–preparation of squash, jam, RTS, syrup, candy, ketchup, sauce, pickles, chutney (hot and sweet), dehydrated products, brining – comparative study of ambient and refrigerated storage – visit to food processing units.

Lecture Schedule

- 1) Importance and scope of post – harvest technology of fruits and vegetables.
- 2) Post-harvest technology of spices, plantation crops and cut flowers
- 3) Causes for post-harvest loses and maturity indices for fruits and vegetables.
- 4) Pre and post-harvest physiological changes during development, maturity and ripening of fruits.
- 5) Pre harvest factors influencing post-harvest life.
- 6) Methods to hasten or delay ripening of fruits.
- 7) Post-harvest treatments like pre-cooling, washing, grading, vapour heat treatment and fumigation.
- 8) Waxing of fruits and vegetables.
- 9) Role of ethylene in post-harvest technology.
- 10) Storage methods – low temperature storage, refrigerated storage.
- 11) Controlled Atmospheric Storage, Modified Atmospheric Storage and
- 12) Hypobaric Storage.
- 13) Low cost storage technology.
- 14) Methods of storage for local and distant market.

- 15) Handling of cut flowers and methods to extend the shelf life.
- 16) Packaging technology for export of fruits by road, air and sea.
- 17) Mid Semester Examination.
- 18) Packaging technology for export by road, air and sea for vegetables.
- 19) Packaging technology for export by road, air and sea for cut flowers.
- 20) Packaging technology for export by road, air and sea for spices and plantation crops.
- 21) Controlled and modified atmospheric packaging, vacuum and edible packaging.
- 22) WTO guidelines for export of horticultural produce.
- 23) CODEX standards and export standards for fruits, vegetables and cut flowers.
- 24) Food safety standards.
- 25) Importance and scope of vegetable preservation industry in India – principles of preservation.
- 26) Preservation with sugar.
- 27) Preservation with salts, chemicals and bio preservatives.
- 28) Sterilization – pasteurization – dehydration.
- 29) Principles of preservation by canning.
- 30) Principles of preservation by fermentation.
- 31) Processing of dehydrated spice products.
- 32) Minimal processing of fruits and vegetables.
- 33) Irradiation in food processing.
- 34) Utilization of wastes from fruit and vegetable processing industries.

Practical Schedule

- 1) Practice in judging the maturity of horticultural produce.
- 2) Pre harvest treatments to enhance the post-harvest life.
- 3) Assessment of physical, physiological and biochemical changes during ripening
- 4) Methods to hasten or delay ripening.
- 5) Determination of physiological loss in weight and quality.
- 6) Pre-harvest treatments to enhance the post-harvest life.
- 7) Storage.
- 8) Packaging studies for fruits, vegetables, cut flowers and dry flowers.
- 9) Waxing.
- 10) Identification and study of working of equipments used in processing units.
- 11) Preparation of squash, RTS and syrup.
- 12) Preparation of jam, jelly and marmalade.
- 13) Preparation of sauce and ketch-up.
- 14) Preparation of pickles.
- 15) Preparation of dehydrated products.
- 16) Visit to food processing units.
- 17) Orientation for final practical examination.

REFERENCES

- 1) Ashwani, K., Goel, Rajender Kumar, Satwinder, S. Mann. 2007. Post – Harvest Management and Value Addition. Daya Publishing House, New Delhi.
- 2) Giridharilal, G.S. Siddappa and G.L. Tandon. 2000. Preservation of Fruits and Vegetables. Publication and Information Division. ICAR, New Delhi.
- 3) Jacob John, P. 2008. A Hand Book of Post-Harvest Management of Fruits and Vegetables. Daya Publishing House, New Delhi
- 4) Manoranjan Kalia 2006, Post-harvest Technology of Vegetables, Agrotech publishing academy, Udaipur
- 5) Nirala, V.K. 2011. Harvest Technology of the Horticulture Crops. Vista International Pub House.
- 6) S. Saraswathy, T.L. Preethi, S. Balasubramanyan, J. Suresh, N. Revathy and S. Natarajan. 2010, Post-harvest Management of Horticultural Crops, Agrobios (india), Jodhpur.
- 7) Sharma, S.K. and Mc Nautiyal. 2009. Postharvest Technology of Horticultural Crops. New India Publishing Agency.
- 8) Subash Chadra Swain. 2013. Post Harvest Management of Horticultural Crops for Food and Nutritional Security. Mangiam Publications. Pub & Dis.
- 9) Sudheer, K.P. and V. Indira. 2007. Post-Harvest Technology of Horticultural Crops, New India Publishing Agency, New Delhi.

AEX 225 : EXTENSION METHODS AND AUDIO VISUAL AIDS (1+1)

THEORY

Unit-I : Rural Sociology

Sociology – Rural Sociology – Characteristics of rural society, Rural – urban differences. Leader – Classification, role of leaders in extension, identification of leaders.

Unit-II : Extension Education

Extension – Definition, need for extension, Teaching – learning process, Adoption – meaning, stages, adopter categories and their characteristics.

Unit-III : Extension Teaching Methods

Extension methods – classification based on use and form. Individual contact methods – farm and home visit, office calls, telephone calls, result demonstration. Group contact methods – method demonstration, group meetings, brain storming, role play, organizing small group training. Mass contact methods – campaigns, exhibition, farmers day, field trip, TV, radio.

Unit-IV : Audio – Visual Aids

Extension aids – Audio aids, Visual aids and Audio – Visual aids. Farm publications – news paper, magazines, leaflets, folders, pamphlets.

Unit-V : Modern Methods of Communication

Advances in communication technology – Internet, agri portal, information Kios, kisan call centers, video conferencing, and tele conferencing.

PRACTICAL

Preparation of posters, charts, graphs, flash cards and flannel graphs, leaflets, pamphlets, and folders, practicing public speaking, handling over head projector, LCD projector. Learning Internet, Exposure to farm and home visit, practicing seminar, workshop and to organize meetings, Conducting group discussion and Farmers Discussion Group (FDG) meeting, Conducting method demonstration, organizing campaigns, exhibition, field days and melas. Visit to village to study the adoption pattern of new technologies, visit to office of joint Director of Agriculture/ADA/ADH/ to know the activities, visit to All India Radio to study the functions, Visit to news paper printing press to know its activities.

Lecture Schedule

- 1) Sociology – Rural Sociology – Characteristics of rural society.
- 2) Rural – Urban differences.
- 3) Leader – Classification, role of leaders in extension.
- 4) Identification of leaders.
- 5) Extension – Definition, need for extension, teaching – learning process.
- 6) Adoption – Meaning, stages, adopter categories and their characteristics.
- 7) Extension methods, classification based on use and form.
- 8) Individual contact methods, farm and home visit, office calls, telephone calls and result demonstration.
- 9) Mid-Semester Examination.
- 10) Group contact methods – method demonstration, group meetings, brain storming and role play.
- 11) Organizing small group training.
- 12) Mass contact methods – campaigns, exhibition, farmers day, field trip, TV, radio.
- 13) Extension aids – Audio aids, Visual aids and Audio – Visual aids.
- 14) Farm Publications – News paper, magazines, leaflets, folders, pamphlets.
- 15) Advances in communication technology – Internet.
- 16) Agri portal, information Kiosk, Kisan call centre.
- 17) Video conferencing, tele conferencing.

Practical Schedule

- 1) Preparation of posters, charts and graphs.
- 2) Preparation of flash cards and flannel graphs.
- 3) Preparation of leaflets, pamphlets and folders.
- 4) Practicing public speaking.
- 5) Handling of overhead projector and LCD Projectors.
- 6) Learning about Internet.
- 7) Exposure to farm and home visit.
- 8) Practicing seminar, workshop and to organize meetings.
- 9) Conducting group discussion and Farmers Discussion Group (FDG) meeting.
- 10) Conducting method demonstration.

- 11) Organizing campaign, exhibition, field days and melas.
- 12) Visit to villages to study the adoption pattern of new technologies.
- 13) Visit to office of Joint Director of Agriculture / ADA / ADH / to know the activities.
- 14) Visit to All India Radio to study the functions.
- 15) Visit to news paper printing press to know its activities.
- 16) Orientation for final practical examination.

REFERENCES

- 1) Adivi Reddy, A. 2001. Extension Education, Sree Lakshmi Press, Bapatla, Andhra Pradesh.
- 2) Chitambar, J.B.1997. Introductory Rural Sociology, New Age International (P) Ltd., Publishers, New Delhi.
- 3) Ray, G.L and Sagar Mandal. 2010. Journalism, Farm Journalism and Communication Skills. Kalyani Publishers, Calcutta.
- 4) Ray, G.L. 2012. Extension Communication and Management, Kalyani Publishers, Naya Prakash, 2006, Bidhan Sarani, Calcutta.
- 5) Rogers, E.M. 2003. Diffusion of Innovations, The Free Press, New York.

GPB 226 : SEED PRODUCTION TECHNOLOGY OF HORTICULTURAL CROPS (1+1)

Unit-I : Seed Quality Management

Seed – definition – importance – quality characteristics – generation system – seed multiplication ratio – seed production – importance – difference between seed and grain – difference between variety and hybrid seed production.

Unit-II : Principles of Seed Production

Basic principles of seed production – genetic and agronomic principles. Pre and post harvest technologies. Seed production in tropical vegetables – tomato, brinjal, chilliy – bhendi, vegetable cowpea, lablab and cluster bean.

Unit-III : Seed Production for Vegetables

Seed production in ashgourd, bittergourd, ribbedgourd, snakegourd, bottlegourd, onion, amaranthus and moringa. Seed production in temperate – vegetables – cabbage, cauliflower, carrot, beetroot and potato.

Unit-IV : Seed Production of Flower and Spices

Seed production in papaya and coconut – Seed production in spices – coriander and fenugreek. Flower crops – marigold, gampherina and cockscomb. Medicinal plants – ashwagandha, periwinkle and senna.

Unit-V : Seed Certification of Quality Control

Seed certification – phases and procedures – Seed testing – principles seed testing. Seed Act, seed rules and Seed law enforcement – duties and responsibilities of seed inspector.

PRACTICAL

Identification and study of seed structure – practicing pre sowing seed management techniques (priming, coating and pelleting) – Identification of contaminants, rousing and maintenance of field standards in seed production plots

– practicing emasculation and dusting techniques (tomato / brinjal / okra) – studies on physiological and harvestable maturity – practicing different seed extraction methods – practicing seed grading techniques – practicing pre storage seed treatment and packing materials and maintenance of seed godown. Study of seed certification procedures and field counting. Visit to vegetable seed production plots and processing Unit–Visit to Directorate of Seed Certification – Study of Seed sampling, mixing and dividing – analysis of physical purity and estimation of seed moisture – conducting germination tests and seedling evaluation – practicing quick viability test – planning seed production.

Lecture Schedule

- 1) Seed – definition – importance – quality characters and generation system of seed multiplication.
- 2) Seed multiplication ratio – importance of seed production – difference between seed and crop production – difference between variety and hybrid seed production.
- 3) Principles of seed production – genetic and agronomic principles.
- 4) Seed production in tomato and brinjal.
- 5) Seed production in chilli and bhendi.
- 6) Seed production in vegetable cowpea, lablab and cluster bean.
- 7) Seed production in gourds (ashgourd, bittergourd, ribbedgourd, snakegourd and bottlegourd).
- 8) Seed production in onion, amaranthus and moringa.
- 9) Mid Semester Examination.
- 10) Seed production in cabbage, cauliflower, carrot and beetroot.
- 11) Seed production in potato.
- 12) Seed production in papaya and coconut.
- 13) Seed production in coriander and fenugreek.
- 14) Seed production in marigold, gampharina and cockscomb.
- 15) Seed production in ashwagandha, periwinkle and senna.
- 16) Seed certification – phases and procedures, principles and utility of seed testing.
- 17) Seed Act and Rules – Seed law enforcement – duties and responsibilities of seed inspector.

Practical Schedule

- 1) Identification and study of seed structure in horticultural crops.
- 2) Practicing pre-sowing seed management techniques (priming, coating and pelleting).
- 3) Identification of contaminants, rouging and maintenance of field standards in vegetables seed production plots.
- 4) Practicing emasculation and dusting techniques (tomato / brinjal /okra).
- 5) Studies on physiological and harvestable maturity in vegetable crops.
- 6) Practicing different seed extraction methods.
- 7) Practicing seed grading techniques.

- 8) Practicing prestorage seed treatment.
- 9) Packing materials and maintenance of seed godown.
- 10) Study on seed sampling, mixing and dividing.
- 11) Analysis of physical purity.
- 12) Estimation of seed moisture.
- 13) Germination test.
- 14) Seedling evaluation.
- 15) Quick viability test.
- 16) Planning of seed production.
- 17) Orientation for final practical examination.

REFERENCES

- 1) M. Bhaskaran *et al.*, 2004. Text book on Principles of seed production and quality control. Kalyani Publishers, New Delhi.
- 2) Prem Singh Arya. 2006. Vegetable seed production principles. Kalyani Publishers, New Delhi.
- 3) P.Jdazara M.G. Som. 2009. Vegetable seed production and hybrid technology. Kalyani Publishers, New Delhi.
- 4) K.Vanangamudi *et al.*, 2010. Vegetable hybrid seed production and management. Agrobios (India), Jodhapur.
- 5) Jag Paul Sharma. 2011. Quality seed production of vegetable crops. Technological Interventions Volume – I : General Aspect. Kalyani Publishers, New Delhi.

AEC 227 : FARM MANAGEMENT AND MARKETING (1+1)

Objectives

This course aims at imparting knowledge on various aspects of farm management and horticultural marketing. This course would help the diploma students in using different methods and tools for decision making in optimizing farm resources and marketing which would facilitate profit maximization.

THEORY

Unit-I : Farm Management – Nature and Scope

Farm Management – meaning and scope of farm management – Relationship with other sciences – Farm management decisions – Types of farming: specialized, diversified and mixed farming. Systems of farming – state farming, collective farming, cooperative farming, capitalistic farming.

Unit-II : Farm Planning and Budgeting

Farm planning – meaning – need for farm planning – Types of farm plans – simple farm plan and whole farm plan – Characteristics of a good farm plan – Basic steps in farm planning – Farm budgeting – meaning – Farm budgets – Enterprise budgeting – partial budgeting and whole farm budgeting.

Unit-III : Farm Risk Management

Distinction between risk and uncertainty – Sources of risk and uncertainty – Production and technical risks – price risk – financial risk – Methods of reducing risks.

Unit-IV : Horticultural Marketing – Nature and Scope

Concepts and definition of marketing – Scope and importance of horticultural marketing – Classification of markets – Characteristics of horticultural commodities – Market forces – Demand and supply – Marketing channel – Marketing costs and marketing margins – Price spread. Marketed and marketable surplus.

Unit-V : Marketing Functions and Institutions

Marketing functions – Packaging – Transportation – Grading and standardization – Warehousing – Processing – FSSAI – Cold storage. Marketing agencies and institutions – Cooperative marketing societies – Role of regulated markets – NAFED – TANFED – NHB. Role of specialized agencies – FCI, CWC, SWC in marketing of horticultural commodities – Commodity boards. Marketing of agricultural inputs – Market information and intelligence – AGMARKNET, DEMIC, DMI – Usage of market information.

PRACTICAL

Visit to farm households – Collection of data on cost of cultivation – Computation of cost of cultivation of horticultural crops – Preparation of farm plan and layout – Farm records and accounts – Farm inventory – Valuation of farm assets – Methods of computing depreciation – Farm financial statements – Net worth Statement, Income statement. Farm budgeting – Complete budget and partial budgets. Visit to village shandies, Farmers' markets, wholesale markets for horticultural crops – Marketing channels – marketing costs and marketing margins – price spread. Visit to cooperative marketing society – Regulated markets / cold storage units – Visit to processing units – AGMARK lab – Visit to agricultural input trading centers.

Theory Schedule

- 1) Farm Management – meaning and scope of farm management – Relationship with other sciences.
- 2) Farm management decisions : strategic decision, operations decision, financial decisions, marketing decisions.
- 3) Types of farming: specialized, diversified and mixed farming.
- 4) Systems of farming – state farming, collective farming, cooperative farming, corporate farming.
- 5) Farm planning – meaning – need for farm planning – Types of farm plans – simple farm plan and whole farm plan – Characteristics of a good farm plan – Basics steps in farm planning.
- 6) Farm budgeting – meaning – Farm budgets – Enterprise budgeting – partial budgeting and whole farm budgeting.
- 7) Distinction between risk and uncertainty – Sources of risk and uncertainty.
- 8) Production and technical risks – price risk – financial risk – Methods of reducing risks.
- 9) Mid Semester Examination.

- 10) Concepts and definition of marketing – Scope and importance of horticultural marketing – Classification of markets.
- 11) Characteristics of agricultural commodities. Market forces – Demand and supply.
- 12) Marketing channel – marketing costs and marketing margins – price spread. Marketed and marketable surplus.
- 13) Marketing functions – Packaging – Transportation – Grading standardization – Warehousing – Processing – FSSAI – Cold storage.
- 14) Marketing agencies and institutions – Cooperative marketing societies – Role of regulated markets. NAFED – TANFED – NHB.
- 15) Commodity boards – Coffee board, Spices board, NMPB, Rubber board.
- 16) Marketing of agricultural inputs – seeds, fertilizers, pesticides, machinery.
- 17) Market information and intelligence – AGMARKNET, DEMIC, DMI – Usage of market information.

Practical Schedule

- 1) Visit to farm households – Collection of data on cost of cultivation.
- 2) Computation of cost of cultivation of horticultural crops.
- 3) Preparation of farm plan and layout.
- 4) Farm records and accounts – Production records and financial records.
- 5) Farm inventory analysis – Valuation of farm assets.
- 6) Depreciation : Methods of computing depreciation.
- 7) Preparation and analysis of Net worth Statement.
- 8) Preparation and analysis of Income statement.
- 9) Farm budgeting – Complete budget and partial budget.
- 10) Visit to village shandies/vegetable market/farmers markets and study the market structure and market channel.
- 11) Visit to wholesale markets/commission mundies for horticultural crops and study the market structure.
- 12) Estimation of marketing costs, marketing margins and price spread.
- 13) Visit to cooperative marketing society.
- 14) Visit to regulated market / cold storage units.
- 15) Visit to processing units.
- 16) Visit to AGMARK lab agricultural input trading centers.
- 17) Orientation for final practical examination.

REFERENCES

- 1) Acharya S.S. and N.L. Agarwal, 2015, Agricultural Marketing in India, Oxford & IBH Publishing Company, New Delhi.
- 2) Dhondyal, S.P., G.N. Singh, 2011. Production Economics and Farm management, Amar Publishing House, Meerut.
- 3) Johl, S.S. J.R. Kapur, 2006, Fundamentals of Farm Business Management:, Kalyani Publishers, New Delhi.
- 4) Raju, V.T. and Rao, D.V.S., 2015. Economics of Farm Production and Management, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
- 5) Subba Reddy, S. Raghu Ram, P. Neelakanta Sastry, T.V. and I. Bhavani Devi, 2016, Agricultural Economics, Oxford & IBH Publishing Company, New Delhi.

TAM 228 : தமிழ் வழி தவகழ் பழ்மாழ்ற வழிழ் றைகழ் (0+1)

செய்ய்றை

கலைச் சொச்சு - வேளாச் மை, வச் டாரவழ்ச்ச் . கச்ச் ரை எச் ச் தச் - செச்சிச் கச்ச் ரை, பொச்ச் கச்ச் ரை, கச்ச் தச் எச் ச் தச் - அச் வலகச் கச்ச் தச்; , உழவச்சுச் ச்ச் கச்ச் தச், செச்சி தயாரிச்சுத், பச்சிரிச்சுக் ஆசியச்ச்ச் கச்ச் தச் எச் ச் தச் . வானொச்ச்ச் செச்சி தயாரிச்சுத் வச் டார வழ்ச்சுக்கேசுப் மொழிநடை கையாச் தச் . அச்ச்ச் பிழைதிச்சுத் மச்ச்ச் பிழையிச் றி எச் ச் தச் . மேடைச்சுப்பேச்ச்ச் . கவியரசுக் - வேளாச் மைச் கவிதை, ச்ச் மொழி; - கச் காச்சி, கச்ச்ச்ச் ச்சுக்காச்சி, பச்ச் மச் றச் - உரைகச் , உரையாடச் , கலச்ச்ச் ரையாடச் , நேச்சுக்காணச் . வேளாச் மை நாடகச் - செயச் விளச்சுச் ச்சுடச்சுக் - பாரச்சுப்பரிய தொழிச் ச்சுப்புகளை கச் டறிச்சுப் பொச்ச் காணச் , தச் ச்சுறிச்சுத் தயாரிச்சுத், வேலைச்ச்ச் விச் ணச்சுப்பிச்சுத், நேச்ச்சுக் தேச்ச்சு அதை எதிச்சுக்கொச்ச்ச் ச்சு றைகச்ச்ச் .

செய்ய்றை அய்டவணை

1. கலைச் சொச்சு - வேளாச் மைச்சுக்கலைச் சொச்சு , வச் டாரவழ்ச்ச்ச் சொச்சு
2. கச்ச் ரைஎச் ச் தச் - கச்ச் ரை வகைகச் , வேளாச் செச்சிச் கச்ச் ரை எச் ச் தச் , பொச்ச்சுக்கச்ச் ரை எச் ச் தச்
3. கச்சுத் எச் ச் தச் - அச் வலகச் கச்சுத் எச் ச் தச் , உழவச்சுச்ச்ச் கச்சுத் எச் ச் தச்
4. செச்சிச்சுத்தாச் ச்ச்ச் செச்சி தயாரிச்சுத் , பச்சிரிச்சுக் ஆசியச்ச்ச் கச்சுத் எச் ச் தச்
5. வானொச்ச்ச் செச்சி தயாரிச்சுத் - வச் டார வழ்ச்சுக்கேசுப் மொழி நடைகையாச் தச்
6. அச்ச்சுப்பிழை திச்சுத்தச் மச்ச்ச் பிழையிச் றிஎச் ச் தச் பயிச்சி
7. மேடைச்சுப்பேச்ச்ச் - வரலாச் , வகைகச் , நடைகச் , பச்ச்சுக்கச்
8. இடைச் பச் வச் தேச்ச்ச்
9. கவியரசுக் - வேளாச் மைச் கவிதை
10. ச்ச் மொழிகச் தயாரிச்சுத் - கச் காச்சி, கச்ச்ச்ச் ச்சுக்காச்சி
11. பச்ச் மச் றச் - வேளாச் தலைச்சிப் பச்ச் மச் றச்
12. மேடைச் பேச்ச்ச் - உரைகச் - தலைமைச்சுரை, வாச்ச்ச்சுரை, நச்சுறிச்சுரை நிகச்ச்ச்சுத்
13. உரையாடச் - கலச்ச்ச் ரையாடச் , நேச்சுக்காணச்
14. வேளாச் மை நாடகச் மச்ச்ச் செயச் விளச்சுச்ச்சுடச்சுக் நடச்ச்சுத்
15. பாரச்சுப்பரியதொழிச் ச்சுப்புகளைகச் டறிச்சுப் பொச்ச் காணச்
16. தச் ச்சுறிச்சுத் தயாரிச்சுத், வேலைச்ச்ச் விச் ணச்சுப்பிச்சுத், நேச்ச்சுக் தேச்ச்சு அதை எதிச்சுக்கொச்ச்ச் ச்சு றைகச்ச்ச்
17. செய்ய்றை தேய்ய் .

