



ANNAMALAI UNIVERSITY
FACULTY OF AGRICULTURE
DIPLOMA IN AGRICULTURE
(ON-CAMPUS) (2017–2018 ONWARDS)
REGULATIONS AND SYLLABUS
REGULATIONS

1. Title and Scope

- 1.1. These academic Regulations shall be called “Annamalai University Faculty of Agriculture, Diploma in Agriculture (Dip. Agri) regulations for obtaining Diploma in Agriculture 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 their management”. “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 Agriculture/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.

- i) In case of new admission, the fees for the semester are payable in advance failing which they will not be admitted.
- ii) In other cases, the fees are payable within seven working days from the commencement of the semester.
- iii) In the case of default, a fine as per the University rules will be collected.
- iv) 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.
- v) 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.
- vi) 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.
- vii) 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 Agriculture	4	8	65

7. Medium of Instruction

7.1. The medium of Instruction for Diploma in Agriculture 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	<u>100</u>

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
Viva – voce	–	10
Total	40	60

D. Crop Production AGR 212 & AGR 222

Particulars	Mid Semester Examination	Final Examination
Field Evaluation	20	20
Written Examination	20	25
Record	–	5
Assignment	–	5
Viva – Voce	–	5
Total	40	60

E. Study Tour: AEX 226 (0+1) ;

The course AEX 226 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	
Viva voce	10	
Total	100	

F. Commercial Agriculture CAG 217 (0+2) & CAG 227(0+2)

A student can choose a commercial agriculture programme of his/her choice. The maximum number of students allowed to register in a department will be decided by the Dean depending on enrolment. If more number of students opt for a same department, the particular subject mark is considered for selecting a student.

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 @ $\frac{1}{2}$ 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 1 question out of 2	5
Total	20

- 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 @ 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 5 questions (either or pattern from each Unit)	25
Total	40
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 reappearance 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 above 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 Agriculture 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 Agriculture 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.

SCHEME OF EXAMINATIONS**FIRST SEMESTER**

S.No.	Course No.	Course Title	Credit Hrs.
1.	AGR 111	Principles of Agronomy and Agricultural Meteorology	1+2
2.	AGR 112	Irrigation and Weed Management	1+1
3.	AGM 113	Basic and Applied Microbiology	1+1
4.	SAC 114	Soils and their Management	1+1
5.	COM 115	Introduction to Computer Applications	0+1
6.	HOR 116	Propagation Methods in Horticultural Crops	0+1
7.	AEG 117	Farm Machinery and Post Harvest Processing	2+1
8.	PED 118	Physical Education	0+1
Total			6+9=15

SECOND SEMESTER

S.No.	Course No.	Course Title	Credit Hrs.
1	AGR 121	Agronomy of Field Crops – I	1+1
2	AEN 122	General and Economic Entomology	2+1
3	PAT 123	Principles of Plant Pathology	1+1
4	AGM 124	Energy and Environment	1+1
5	SAC 125	Soil Nutrient Management	1+1
6	GPB 126	Breeding of Field Crops I	1+1
7	AHS 127	Principles of Livestock and Poultry Management	2+1
8	ENG 128	English Language for Effective Communication	0+1
Total			9+8=17

THIRD SEMESTER

S.No.	Course No.	Course Title	Credit Hrs.
1	AGR 211	Agronomy of Field Crops II	1+1
2	AGR 212	Crop Production I	0+2
3	AEN 213	Crop Pests and their Management	1+2
4	PAT 214	Crop Diseases and their Management	1+2
5	GPB 215	Breeding of Field Crops II	1+1
6	AEC 216	Agricultural Economics and Marketing	2+1
7	CAG 217	Commercial Agriculture I	0+2
Total			6+11=17

FOURTH SEMESTER

S.No.	Course No.	Course Title	Credit Hrs.
1	AGR 221	Dry Farming and Agroforestry	2+1
2	AGR 222	Crop Production II	0+2
3	GPB 223	Seed Production Techniques	1+1
4	HOR 224	Vegetable and Fruit Culture	2+1
5	AEX 225	Extension Methods and Audio Visual Aids	1+1
6	AEX 226	Study Tour	0+1
7	CAG 227	Commercial Agriculture II	0+2
8	TAM 228	Language for Communication (jkpo; top jfty; ghpkhw;w topKiwfs;)	0+1
Total			6 + 10=16
			27+38=65

SYLLABUS**FIRST SEMESTER****AGR 111 : PRINCIPLES OF AGRONOMY AND AGRICULTURAL
METEOROLOGY (1+2)****THEORY****Unit-I : Introduction to Agriculture**

Agriculture – Definition and Scope 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 Principles in Crop Production

Cropping systems – definitions – principles and Agricultural operations – Tillage and tith – objectives and types of tillage – Primary tillage, secondary tillage and intercultural operations, Modern concepts of tillage. Implements and tools in Agriculture – Seeds and sowing – Seed treatment – Nursery – Transplanting – Plant population and crop geometry. After cultivation – gap filling and thinning. Weeding and irrigation.

Unit-III : Nutrient Management

Manures – organic manures – green manures – biofertilizers. Fertilizers – methods of application – basal, split and foliar application. Harvesting and processing – Dry farming – Watershed management. Organic farming – Sustainable agriculture.

Unit-IV : Introduction to Agricultural Meteorology

Meteorology – Agricultural meteorology – definition – importance in crop production. Atmosphere – components and its importance.

Unit-V : Weather Parameters and Forecasting

Weather parameters and their role in crop production. Rainfall – spatial and temporal variability in Tamil Nadu across seasons. Agro climatic zones of Tamil Nadu – Weather forecasting services in India.

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, 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 and transplanting, weeding and irrigation. Identification of organic manures and green manures – inorganic fertilizers – identification of fertilizers. Practicing Foliar spray – Calculations of Spray Fluid – Methods of utilization of organic wastes and composting of coir pith and practice in application of organic manures, green manure and inorganic fertilizers – measurement of growth and yield components of major crops.

Recording observation on rainfall – single Stevenson screen – Maximum, minimum, dry and wet bulb thermometers – Wind vane and anemometer. Collection of historical rainfall data, temperature data and computing mean and interpretation, standard week – wise, month – wise and season – wise mean and interpretation.

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 Factors affecting crop production – moisture, aeration, light, temperature and nutrients.
- 3) Basic principles of agricultural operations – tillage and tith, objectives and types of tillage.
- 4) Primary and secondary tillage – intercultural operations, modern concepts of tillage.
- 5) Cropping systems – principles – merits and demerits.
- 6) Seeds and sowing – seed treatment, optimum plant population, crop geometry
- 7) Nursery – transplanting – after cultivation – gap filling and thinning.
- 8) Weeding and irrigation.
- 9) Mid Semester Examination.
- 10) Manures – organic manures, green manures, biofertilizers, fertilizers – methods of application – basal, split and foliar application.
- 11) Harvesting and processing.
- 12) Dry farming, watershed management – definition – concept.
- 13) Organic Agriculture, sustainable agriculture – definition – concept.
- 14) Meteorology – agricultural meteorology – importance of agricultural meteorology for crop production.
- 15) Atmosphere – components and its importance – weather parameters and their role in crop production.
- 16) Rainfall – spatial and temporal variability in Tamil Nadu across seasons – global warming and its impacts.
- 17) Weather forecasting and forewarning of pest and diseases – Agromet services in India – agro climatic zones of Tamil Nadu.

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 primary tillage implements.
- 4) Acquiring skill in the secondary tillage implements.
- 5) Practicing the use of special purpose implements (rotary weeders).
- 6) Estimating the efficiency of tillage implements.
- 7) Practicing implements used in rice cultivation (puddler and cono – weeder).
- 8) Skill learning and practicing nursery bed preparation for low lands.

- 9) Practicing nursery bed preparation for irrigated uplands.
- 10) Practicing trimming and plastering in wet lands.
- 11) Land shaping and lay out of field for upland irrigated conditions.
- 12) Acquiring skills in seed treatment of plant protection chemicals.
- 13) Learning seed, seedling treatment and soil application of bio – fertilizers.
- 14) Practicing sowing and transplanting.
- 15) Practicing manual weeding and spraying with different formulations.
- 16) Irrigation layout for upland irrigated crops.
- 17) Practicing application of organic manures.
- 18) Practicing application of green manures.
- 19) Study of biofertilizers.
- 20) Inorganic fertilizers – identification of fertilizers – calculation based on fertilizer schedule.
- 21) Practicing various methods fertilizer application.
- 22) Practicing spray calculation and foliar application of fertilizers.
- 23) Practicing earthing up and understanding its importance.
- 24) Measurement of growth components of major crops.
- 25) Measurement of yield components and yield of major crops.
- 26) Visiting Agro met observatory and getting acquaintance with instruments.
- 27) Handling rain gauge and recording rainfall.
- 28) Handling of maximum, minimum, dry and wet bulb thermometers, Aassmann psychrometer and its recording.
- 29) Study of wind vane and anemometers, evaporimeter, Bellani's Pyranometer.
- 30) Analysis of historic rainfall and temperature data and tabulation.
- 31) Computing mean of rainfall data; standard week – wise, month – wise and season – wise.
- 32) Computing mean of temperature data; standard week – wise, month – wise and season – wise.
- 33) Gathering information on forecasts, synoptic chart, crop weather calendar and understanding agro advisories.
- 34) Orientation for final practical examination.

Reference Books

- 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.

AGR 112 : IRRIGATION AND WEED MANAGEMENT (1+1)

THEORY

Unit-I : Soil – Plant – Water Relationship

Irrigation – sources of water for irrigation – water movement, soil – plant – atmosphere continuum – soil moisture constants – available soil moisture – effect of water stress on crop yield – Water use efficiency.

Unit-II : Water Requirement and Methods of Irrigation

Water requirement of major crops – critical stages of water requirement – irrigation scheduling – Irrigation methods – merits and demerits – Irrigation water use efficiency – management of poor quality irrigation water – soil erosion due to water and its control measures.

Unit-III : Weed Biology and Ecology

Weeds – definition and importance of weed control in crop production – classification of weeds – methods of weed control – manual, mechanical, cultural, chemical and biological methods – merits and demerits.

Unit-IV : Chemistry of Herbicides

Herbicide – classification based on mode of action – method of application – common herbicides available in the market.

Unit-V : Weed Management

Weed control practices for major crops – parasitic, problematic and aquatic weed management – integrated weed management – concepts and practices.

PRACTICAL

Measurement of irrigation water – field preparation for increased irrigation efficiency – methods of irrigation – planning and layout – drip, sprinkler and surge irrigations – calculation of water requirement of important crops. Soil and water conservation practices.

Identification and study of weeds – practicing different methods of weed control – identification of herbicides and biological agents for weed control – study of sprayers – types of nozzles for herbicide application – methods of herbicide application – formulated product and spray fluid calculation – Control of parasitic, problematic and aquatic weeds.

Theory Lecture Schedule

- 1) Irrigation – definition – sources of water, area under irrigation in Tamil Nadu.
- 2) Water movement – Soil – plant – atmosphere continuum and importance of water for crop cultivation.
- 3) Soil moisture constants – available soil moisture – field capacity – permanent wilting point and effect of soil moisture stress on crop yield.
- 4) Water requirement of major crops – water use efficiency – critical stages of water requirements.
- 5) Irrigation scheduling.
- 6) Methods of irrigation – check basin, furrow methods, border strip, ring basins, drip, sprinkler, surge and rain guns – merits and demerits.

- 7) Crop water use efficiency under various irrigation methods, management of poor quality irrigation water.
- 8) Erosion – soil erosion due to water and erosion control measures.
- 9) Mid Semester Examination.
- 10) Weeds – definition – scope and importance of weed management in crop production.
- 11) Classification of weeds – biological and agronomical characters for weed dispersal.
- 12) Methods of weed control – manual, mechanical, cultural, chemical and biological methods – advantages and disadvantages.
- 13) Classification of herbicides based on mode of action and method of application
- 14) Weed management for major crops.
- 15) Management of parasitic, problematic and aquatic weeds.
- 16) Integrated weed management – concepts and practices.
- 17) Economics of weed control – weed control efficiency.

Practical Schedule

- 1) Measurement of irrigation water.
- 2) Field preparation and layout of surface irrigation methods.
- 3) Planning and layout of drip, sprinkler and surge irrigation methods.
- 4) Study of irrigation methods for different crops.
- 5) Irrigation scheduling for important crops.
- 6) Calculation of water requirement of important crops.
- 7) Study of soil and water conservation practices.
- 8) Working out crop water use efficiency for various irrigation methods.
- 9) Classification and identification of weeds.
- 10) Practicing manual methods of weed control.
- 11) Practicing mechanical methods of weed control.
- 12) Study of sprayers.
- 13) Calculation of formulated product and spray fluid for herbicide application.
- 14) Identification of herbicides – practicing herbicides application techniques.
- 15) Practicing parasitic and aquatic weed control.
- 16) Practicing management of perennial (*Cynodon*) and problematic (Parthenium) weeds.
- 17) Orientation for final practical examination.

Reference Books

- 1) Michael, A.M. 1997. Irrigation: Theory and Practice Vikas Publishers.
- 2) Jaganathan R., and R. Jayakumar. 2003. Weed Science Principles, Kalyani Publishers, New Delhi.
- 3) Rao.V.S. 2000. Principles of weed science, Oxford and IBH publishing Co. Pvt. Ltd. New Delhi.
- 4) Sundari. A., Kalaisudarson.S., and A.P. Srinivasaperumal, 2011. Hand book on practical weed management. Hamsa pathippagam, Chennai.
- 5) Thirupathi, M and R. Rex Immanuel, 2012. Irrigation Management and dry farming Technologies, Velan pathipakam, Tamil Nadu.

AGM 113 : BASIC AND APPLIED MICROBIOLOGY (1+1)

Aim

This course is designed to give students an understanding of the role of microorganisms in Agriculture and industrial processes pertaining to microbial products. The course encompasses the use of microorganisms in the manufacture of Biological products like biofertilizers, biopesticides, biowaste management using microorganisms – microbial value addition – alcoholic beverages, wine making and preparation of fermented foods.

THEORY

Unit-I : Basic Microbiology – An Overview

Microorganisms (bacteria, fungi, Algae, yeast) – definitions – importance of microorganisms – Beneficial microbes in Agriculture and Industry – Commercially important fermentations – organisms.

Unit-II : Biofertilizer Production

Bacterial biofertilizers types – mass production methods and techniques – Operation of Autoclave, fermentor – Production of liquid and carrier based biofertilizers – Algal biofertilizers production – Production of VAM – Packing.

Unit-III : Biowaste Management Using Microbes

Agricultural wastes – Solid and liquid waste management – Composting – Preparation of enriched compost – Biofuel production using sugarcane molasses.

Unit-IV : Antibiotics & Biocontrol Agents

Antibiotics – Production of penicillin, streptomycin – Biocontrol agents – Mass production of *Pseudomonas* & *Tricoderma viride*.

Unit-V : Fermented Foods

Microbiological production of fermented foods – bread; traditional fermented food products; Fermented dairy products – cheese, probiotics, yogurt and other fermented foods – sauerkraut, pickles – Wine making – *Spirulina* production.

Lecture Theory Schedule

- 1) Basic concepts in microbiology – definitions bacteria, fungi, yeast and algae.
- 2) Importance of microorganisms, Beneficial microbes in Agriculture and industry – Commercially important fermentations.
- 3) Mass production methods – Fermentor, solid state and liquid state fermentation.
- 4) Bacterial biofertilizers types – operation of Autoclave, fermentor – production of Liquid and carrier based biofertilizers.
- 5) Algal biofertilizers production.
- 6) Production of VAM biofertilizer.
- 7) Agricultural wastes, Solid and liquid waste management, composting Preparation of enriched compost .
- 8) Biofuel production using sugarcane molasses.
- 9) Mid Semester Examination.
- 10) Antibiotics – Production of penicillin, streptomycin.

- 11) Biocontrol agents – Mass production of *Pseudomonas & trichoderma viride*.
- 12) Microbiological production of fermented foods, traditional fermented food products.
- 13) Fermented dairy products – cheese, probiotics, yogurt.
- 14) Other fermented foods – sauerkraut, pickles.
- 15) Commercial production of bread and wine.
- 16) Mass production of *Spirulina*.
- 17) Review of all Lecturers.

PRACTICAL

- 1) Description of glassware and instruments used in microbiology.
- 2) Types of media and carrier materials for biofertilizer production.
- 3) Preparation of culture media for bacterial biofertilizers. Eg. *Azotobacter* and Phosphobacteria.
- 4) Pilot scale production of bacterial biofertilizer.
- 5) Mass production using fermentor – Visit to biofertilizer production laboratory.
- 6) Mass production of Algal biofertilizers and VAM.
- 7) Production of ethanol from molasses – Visit to distillery unit.
- 8) Production of Enriched compost.
- 9) Mass production of *Trichoderma viride*.
- 10) Mass production of *Beauveria* and *Metarrhizium*.
- 11) Mass production of *Pseudomonas* biocontrol agent.
- 12) Bread making – Visit to bakery unit.
- 13) Production of wine.
- 14) Production of cheese and yogurt.
- 15) Production of pickles and sauerkraut.
- 16) *Spirulina* production.
- 17) Orientation for final Practical Examination.

Reference Books

- 1) Michael J. Pelczar, JR., E.C.S. Chan, Noel R. Krieg, 2005. Microbiology.
- 2) Casida, JR. L.E. 2006 Industrial Microbiology, New Age International Publishers, New Delhi.
- 3) Subba Rao, N.S., 1999. Soil Microorganisms and Plant Growth, Oxford & IBA, New Delhi.
- 4) Kannaiyan, S, 2013. Biofertilizer Technology , Scientific Publishers, Jodhpur.
- 5) Reddy et al, 2017. Applied Microbiology (Agricultural Environment), Food and Industry and Microbiology Scientific Publishers, Jodhpur.

SAC 114 : SOILS AND THEIR MANAGEMENT (1+1)

THEORY

Unit-I : Soil Components and Physical Properties

Definition of soil – its main components – Soil physical properties – Colour, Texture, Structure, Bulk density, Pore space, Soil water, Soil air, Soil Temperature and their significance in crop production.

Unit-II : Soil Chemical and Biological Properties

Soil chemical properties – Soil pH, EC and CEC – Soil Organic Matter and its importance on soil properties. Organic matter decomposition – Carbon and nitrogen cycle – Soil Micro organisms.

Unit-III : Soils of Tamilnadu and Problem Soils

Soils of Tamil Nadu. Problem soils – acid, saline and sodic soils – their formation, reclamation and management.

Unit-IV : Soil Physical Constraints

Physically degraded soils – surface crusting and hardening, subsoil hardpan, fluffy soil, slowly and highly permeable soils – Characteristics and management. Management principles for sandy, clayey, red lateritic and dry land soils.

Unit-V : Irrigation Water Quality

Quality of irrigation water – Sources of poor quality water – quality parameters – indices and classification. Management of brackish water for irrigation; salt balance under irrigation; Agronomic practices in relation to problematic soils; cropping pattern for utilizing poor quality ground waters.

PRACTICAL

Soil sampling – Analysis of soil for pH and EC, Texture by feel method, Bulk density, True density and pore space, Determination of soil moisture, soil colour. Identification of problem soils. Irrigation water quality.

Theory Lecture Schedule

- 1) Definition of soil – its main components.
- 2) Soil physical properties – Colour, Texture, Structure.
- 3) Bulk density, Particle density and Pore space.
- 4) Soil water and its significance in crop production.
- 5) Soil air, temperature and their significance in crop production.
- 6) Soil chemical properties – Soil pH, EC and CEC, Carbon and Nitrogen cycle, Soil Organic Matter and its importance on soil properties.
- 7) Decomposition of Soil Organic Matter, Soil Micro organisms – Bacteria, Fungi and Actinomycetes.
- 8) Soils of Tamil Nadu.
- 9) Mid Semester Examination.
- 10) Problem soils – soil physical constraints and their management.
- 11) Problem soils – Acid soils – genesis, reclamation and management.
- 12) Problem soils – Saline soils – genesis, reclamation and management.
- 13) Problem soils – Sodic soils – genesis, reclamation and management.

- 14) Soil physical constraints – surface crusting and hardening, subsoil hardpan, fluffy soil, slowly and highly permeable soils.
- 15) Characteristics and management. Management principles for sandy, clayey, red lateritic and dry land soils.
- 16) Quality of irrigation water – Sources of poor quality water – quality parameters – indices and classification.
- 17) Management of brackish water for irrigation; salt balance under irrigation; Agronomic practices in relation to problematic soils; cropping pattern for utilizing poor quality ground waters.

Practical Schedule

- 1) Study of different soils.
- 2) Skill learning in soil sampling.
- 3) Determination of soil texture by feel method.
- 4) Determination of Bulk density, True density and Pore space by measuring cylinder method.
- 5) Determination of Bulk density by Wax coating method.
- 6) Determination of Bulk density by Core sampler method.
- 7) Determination of soil colour.
- 8) Determination of soil moisture by oven dry method.
- 9) Mid Semester Examination.
- 10) Analysis of soil for pH and EC.
- 11) Visit to local problem soil areas.
- 12) Identification of soil ameliorants.
- 13) Identification of acid soils and their management.
- 14) Identification of saline, sodic and saline – sodic soils and their management.
- 15) Determination of Irrigation water quality – pH, EC.
- 16) Interpretation of irrigation water quality using analytical data.
- 17) Orientation for final Practical Examination.

Reference Books

- 1) Biswas. T.D. and Mukerjee, S.K. 1987. Text book of Soil Science, Tata MacCraw Hill Publishing Company Ltd., New Delhi.
- 2) Brady, N.C. and Raymond, C. Weil. 2013. The Nature and Properties of Soils (14th Edition). Pearson Education, Inc. Publishing as Prentice Hall.
- 3) Dilip Kumar Das. 2004. Introductory Soil Science, Kalyani Publishers, New Delhi.
- 4) Sahai, V.N. 2008. Fundamentals of Soils. Kalyani Publishers, New Delhi.
- 5) Sekhon G.S (Eds.) 2009. Fundamentals of Soil Science, Indian Society of Soil Science, IARI, New Delhi.

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 Practical Examination.

HOR 116 : PROPAGATION METHODS IN HORTICULTURAL CROPS (0+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.

PRACTICAL

Selection of nursery site and layout of nursery components – media for propagation of nursery plants and pot mixture preparation – containers, tools and

implements for nursery – plant propagation structures – methods of sexual and asexual propagation – different methods of cutting, layering, grafting and budding in horticultural crops – special propagation methods in horticultural crops – tissue culture methods of propagation in horticultural crops – hardening and marketing of horticultural crops – hi-tech nursery preparation in horticultural crops – economics of nursery production – visit to commercial nursery production centers.

Practical Schedule

- 1) Selection of nursery site and layout of nursery components.
- 2) Media for propagation of nursery plants and pot mixture preparation.
- 3) Containers, tools and implements for nursery.
- 4) Plant propagation structures.
- 5) Different methods of cutting in horticultural crops.
- 6) Different methods of layering in horticultural crops.
- 7) Raising of rootstocks and scion preparation.
- 8) Different methods of grafting in horticultural crops.
- 9) Mid Semester Practical Examination.
- 10) Different methods of budding in horticultural crops.
- 11) Special propagation methods in horticultural crops.
- 12) Tissue culture methods of propagation in horticultural crops.
- 13) Hardening and marketing of horticultural crops.
- 14) Hi – tech nursery preparation in horticultural crops.
- 15) Economics of nursery production.
- 16) Visit to commercial nursery production centre.
- 17) Orientation for final practical examination.

AEG 117 : FARM MACHINERY AND POST HARVEST PROCESSING (2+1)

THEORY

Unit-I

Farm Power – Sources and their use in agriculture – Status in India – Engine – types – I.C. Engines – classification – Components – Principle and working of Two stroke and Four stroke engines – Diesel engine – Petrol engine – Comparison – Tillage – objectives – types – ploughing methods – Types of plough – Indigenous plough, Mould board plough, disc plough, chisel plough, subsoiler, Rotary plough – advantages and disadvantages – Secondary tillage equipment – cultivators, harrows – types.

Unit-II

Tractors – types and application – matching implement – Power Tiller – Matching Implements – Land forming equipment – rotavator, puddler, bund former, Ridger, Leveller, Manure trampler – Sowing methods – seed cum fertilizer drills – components and functions – Seed metering mechanism – Calibration of seed cum fertilizer drill – Planters – Functions – types.

Unit-III

Pumps for irrigation – centrifugal and submersible – Implements for intercultural operations – weeding and earthing up implements – Sprayers and their functions – classification – Dusters – types and uses – Harvesting tools and equipment – sickles, reapers and combines.

Unit-IV

Post harvest losses – causes and estimates – unit operations of crop processing – Moisture content – hot air oven method – Properties of grains – mass, volume, density, porosity, surface area and sphericity – Threshing – threshers for different crops – parts, terminologies – Winnowing – manual and power operated winnowers – cleaning, grading and sorting – Types of screens – air screen cleaner – reciprocating and rotary types – Grain drying – principles – advantages – types – batch and continuous, mixing and non mixing – LSU drier – construction and operation – Storage of food grains – structures, factors affecting storage, traditional methods – types – bag and bulk storage – Silos – types – uses – advantages.

Unit-V

Rice processing – raw and parboiling – advantages and disadvantages – Unit operations in rice processing – dehusking and polishing – Utilisation of wastes and by – products from rice mills – Pulse milling – wet, dry and CFTRI methods of pulse milling – Pulse milling equipments – construction and operation – Fruits and vegetable processing – processed products – Oil extraction methods and machineries.

PRACTICAL

Study of two and four stroke IC engines – MB plough and disc plough – measurement of size of cut – Study of secondary tillage implements – calibration of seed – cum – fertiliser drill – Identification of parts of tractor – Learning to operate power tiller – Study of Plant protection equipment – Study of weeders – Moisture content determination using thermo gravimetric method – Determination of properties of food grains – Study of grain drying methods – sun drying – mechanical drying – advantages and disadvantages – Study of advance drying methods – Parboiling methods – traditional and modern – Design of bag storage structure – Visit to Modern Rice mill.

Lecture Schedule

- 1) Farm Power – Sources and their use in agriculture – Status of Farm power in India.
- 2) Engine – types – I.C. Engines – classification – Components.
- 3) Principle and working of Two stroke and Four stroke engines – Diesel engine – Petrol engine – Comparison.
- 4) Tillage – objectives – types.
- 5) Primary tillage – objectives – ploughing methods.
- 6) Types of plough – Indigenous plough, Mould board plough, disc plough, chisel plough, subsoiler, Rotary plough – advantages and disadvantages.
- 7) Secondary tillage equipment – cultivators, harrows – types.

- 8) Tractors – types and application – matching implement.
- 9) Power Tiller – Matching Implements.
- 10) Land forming equipment – rotavator, puddler, bund former, Ridger, Leveller, laser leveler.
- 11) Sowing methods – seed cum fertilizer drills – components and functions.
- 12) Seed metering mechanism – Calibration of seed cum fertilizer drill.
- 13) Planters – Functions – types.
- 14) Pumps for irrigation – centrifugal and submersible.
- 15) Implements for intercultural operations – weeding and earthing up – implements.
- 16) Sprayers and their functions – classification – Dusters – types and uses.
- 17) Harvesting tools and equipment – sickles, reapers and combines.
- 18) Mid Semester Examination.
- 19) Post harvest losses – causes and estimates – unit operations of crop processing.
- 20) Moisture content – thermo gravimetric method – wet basis and dry basis.
- 21) Properties of grains – mass, volume, density, porosity, surface area and sphericity.
- 22) Threshing – threshers for different crops – parts, terminologies.
- 23) Winnowing – manual and power operated winnowers – cleaning, grading and sorting.
- 24) Types of screens – air screen cleaner – reciprocating and rotary types.
- 25) Grain drying – principles – advantages – types – batch and continuous, mixing and non mixing.
- 26) LSU drier – construction and operation.
- 27) Storage of food grains – factors affecting storage, traditional methods – types – bag and bulk storage – Storage structures.
- 28) Rice processing – raw and parboiling – advantages and disadvantages.
- 29) Unit operations in rice processing – dehusking and polishing.
- 30) Utilisation of wastes and by – products from rice mills.
- 31) Pulse milling – wet, dry and CFTRI methods, equipments for milling.
- 32) Principles of fruits and vegetable processing.
- 33) Manufacturing of processed products from fruits and vegetables.
- 34) Oil extraction methods and machineries.

Practical Schedule

- 1) Study of working of two and four stroke IC engines.
- 2) Study of MB plough and disc plough – measurement of size of cut.
- 3) Study of secondary tillage implements.
- 4) Study of calibration of seed-cum-fertiliser drill.
- 5) Identification of parts of tractor.
- 6) Learning to operate power tiller.
- 7) Study of Plant protection equipment.
- 8) Study of weeders.

- 9) Mid Semester Examination.
- 10) Moisture content determination using thermo gravimetric method.
- 11) Determination of properties of food grains.
- 12) Study of grain drying methods – sun drying – mechanical drying – advantages and disadvantages.
- 13) Study of advance drying methods.
- 14) Parboiling methods – traditional and modern.
- 15) Design of bag storage structure.
- 16) Visit to Modern Rice mill.
- 17) Orientation for final Practical Examination.

PED 118 : PHYSICAL EDUCATION (0+1)

Practical Schedule

Biomotor abilities – strength, agility, co – ordination, flexibility, endurance and speed. Conditioning exercises, skill development in anyone of the major games 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. Postureand Exercises for good posture.

SECOND SEMESTER

AGR 121 : AGRONOMY OF FIELD CROPS – I (1+1)

Theory

Agronomic Practices including climatic and soil requirement, season and varieties land preparation – Seeds and sowing – Fertilizer management – Irrigation – Weed control – intercultivation operations – Harvesting – Cereals, millets and pulses based cropping systems.

Unit-I : Agronomy of cereals

Rice, wheat and maize – origin – geographic distribution, economic importance, soil and climatic requirements, season and varieties, cultivation practices (from land preparation to harvest) and yield.

Unit-II : Agronomy of major millets

Sorghum, cumbu and ragi – Origin – Geographic distribution, Economic importance, Soil and climatic requirements season and varieties, cultivation practices (From land preparation to harvest) and yield.

Unit-III : Agronomy of minor millets

Varagu, panivaragu, thenai, samai and kudiraivalli – Origin – geographic distribution, economic importance, soil and climatic requirements, varieties, cultivation practices (from land preparation to harvest) and yield.

Unit-IV : Agronomy of pulses

Blackgram, greengram, redgram, cowpea, soybean bengal gram and horse gram – Origin – geographic distribution, economic importance, soil and climatic

requirements, season and varieties, cultivation practices (from land preparation to harvest) and yield.

PRACTICAL

Preparation of nursery for rice – Various methods of nursery preparation – Varieties for different seasons – Utilization of Bio-fertilizers for various crops. Seed treatment for different crops – Cereals, millets and pulses. Practicing field preparation and sowing of cereals, millets and pulses – Studying cost of cultivation for important crops.

Theory Lecture Schedule

- 1) Agronomic practices for rice.
- 2) Agronomic practices for rice – continued.
- 3) Agronomic practices for rice based cropping system.
- 4) Agronomic practices for wheat – continued.
- 5) Agronomic practices for wheat.
- 6) Agronomic practices for maize.
- 7) Agronomic practices for sorghum.
- 8) Mid Semester Examination.
- 9) Agronomic practices for cumbu.
- 10) Agronomic practices for ragi.
- 11) Agronomic practices for minor millets, tenai, samai, varagu, panivaragu and kudiraivali.
- 12) Agronomic practices for black gram and green gram.
- 13) Agronomic practices for redgram.
- 14) Agronomic practices for cowpea.
- 15) Agronomic practices for soybean.
- 16) Agronomic practices for bengal gram and horse gram.
- 17) Cereals and pulses based cropping system.

Practical Schedule

- 1) Establishing crop cafeteria involving major crops.
- 2) Identification of crops and varieties of cereals, millets and pulses.
- 3) Working out nursery area requirement for transplanted crops.
- 4) Practicing nursery preparation for irrigated lowland and upland crops.
- 5) Practicing main field preparation for irrigated lowland and upland.
- 6) Practicing transplanting with optimum aged seedling.
- 7) Practicing different sowing methods for irrigated uplands.
- 8) Practicing seed treatment techniques for field crops.
- 9) Estimation of seed rate and plant population per unit area for important crops.
- 10) Study of system of rice intensification (SRI).
- 11) Practicing foliar nutrition to various crops.
- 12) Practicing manual weeding in irrigated lowland and upland.
- 13) Practicing cono weeder for rice and other types of weeders under upland condition.

- 14) Observation on growth and yield parameters, assessing maturity and estimation of yield of cereals, millets and pulses.
- 15) Visit to nearby Agricultural research stations.
- 16) Working out cost of cultivation for major crops.
- 17) Orientation for final Practical Examination.

Reference Books

- 1) Chidda Singh. 2010. *Modern Techniques of Raising Field Crops*. Oxford and IBH Publishing, Co. Pvt. Ltd. New Delhi.
- 2) *Crop Production Guide*. 2012. Directorate of Agriculture, Chennai and Tamil Nadu Agricultural University, Coimbatore.
- 3) Singh. S.S. 2002. *Crop Management under Irrigated and Rainfed Conditions*. Kalyani Publishers, New Delhi.

AEN 122 : GENERAL AND ECONOMIC ENTOMOLOGY (2+1)

Aim

To acquaint the students with elementary knowledge on insect morphology, principles and practices of Sericulture, Apiculture and Integrated Pest Management.

THEORY

Unit-I : Characters of Insects

Insects – Definitions – Characters of Insects – Dominance of Insects; Elementary knowledge on Insect morphology – Mouth Parts – Wings – Legs.

Unit-II : Economic Entomology

Economic Classification of Insects – Sericulture – Mulberry cultivation and Rearing of Mulberry silk worms – Apiculture – Role of Bees in Crop Productivity – Hiving Bees and Apiary Management. Beneficial Insects – Insect Pollinators – Predators and Parasitoids.

Unit-III : Integrated Pest management

Pest – Definition – Categories of Pests – Pest outbreak – Pest Monitoring – Pest Surveillance – Forecasting – Economic Threshold Level – Economic Injury Level. Pest Management Components – Cultural, Physical, Mechanical, Legal and Integrated Methods – Use of Resistant Varieties, Biological Control – Parasitoids, Predators and Microbial Agents.

Unit-IV : Behavioural tools in Pest management

Semiochemicals – allomones – kairomones – pheromones – semiochemicals in pest management. Sterile male technique – chemosterilants, insect growth regulators – moult inhibitors – Juvenile Hormone mimics – antifeedants and repellents.

Unit-V : Chemicals in Pest management

Pesticides – Groups, Classification – Formulation and Uses, Principles of Pesticides application – Hazards in the use of Pesticides and Environmental Pollution – Safe Handling of Pesticides – Pesticide residue – Resistance and Resurgence.

PRACTICAL

External Features of Grass Hopper – Mouth Parts of Grass Hopper, Bug and Butterfly. Silkworm rearing – Improved Methods and appliances. Bee Keeping, Bee Keeping Appliances. Study of Symptoms and types of damage caused by Pests. Assessment of insect population damage and crop losses in Rice, Cotton, Groundnut, Sugarcane and Pulses. Practicing various pest control methods: Cultural, Physical and Mechanical Methods. Biological Control – Mass culturing of predators and parasitoids. Behavioral approaches – Pheromone Traps – Light Traps – Fish Meal Traps – Yellow Sticky Traps, Different groups of pesticides, their formulations and label information, pesticide application methods and safe handling of pesticides.

Assignment: Students should collect preserve and submit 25 agriculturally important insects.

Lecture Schedule

- 1) Insects, Characteristics of insects, Dominance of Insects – Factors responsible for dominance.
- 2) Insect Mouth Parts and their Modifications.
- 3) Insect Wings and Legs and their modifications.
- 4) Economic Classification of Insects and their importance.
- 5) Sericulture – Mulberry cultivation – Mulberry silkworm – races and their characters.
- 6) Rearing of Mulberry silk worms – Improved Methods.
- 7) Pests and diseases of mulberry silkworm.
- 8) Apiculture – Different Bee Castes, Hiving of bees and Apiary Management.
- 9) Bee Keeping Appliances – Handling Bees and Honey Extraction.
- 10) Bee Enemies and Role of Bees in Crop Productivity.
- 11) Beneficial insects – Predators, Parasitoids and Insect Pollinators.
- 12) Pest – Definition – Categories of Pests – Causes of Pest outbreak.
- 13) Pest Monitoring – Pest Surveillance – Objectives, Survey, Sampling, Techniques and Decision Making.
- 14) Economic Threshold Level – Economic Injury Level – principles and practices – Forecasting.
- 15) Integrated Pest Management – Definition – Objectives – Components of Pest Management – Cultural, Physical, Mechanical and Legal Methods.
- 16) Cultural Methods – Definition – Farm level practices and Community level practices.
- 17) Mid Semester Examination.
- 18) Physical Methods – Definition – Use of Heat, Moisture and Light.
- 19) Mechanical Methods – Definition – Mechanical destruction and Mechanical Exclusion Methods.
- 20) Legal Methods – Definition – Quarantine – pest legislation – Insecticides Act – Phytosanitary Certificate.
- 21) Use of resistant varieties for pest management.

- 22) Biological control methods – Definition – Advantages and Disadvantages.
- 23) Classical examples of parasitoids and predators and their role in pest management.
- 24) Microbial control – Definition – Classical examples for viruses, bacteria, fungi and protozoans in pest management.
- 25) Behavior modifying chemicals and use of pheromones in pest management.
- 26) Sterile male technique – chemosterilants, insect growth regulators – moult inhibitors – Juvenile Hormone mimics – antifeedants and repellents.
- 27) Classification of insecticides based on mode of entry and mode of action.
- 28) Insecticide groups – OP, OC, Carbamate and SP.
- 29) Insecticide formulations – Dust, Wettable powders, Emulsifiable Concentrates, Granules, Fumigations and their uses.
- 30) Acaricides, Rodenticides, Molluscicides and Nematicides – Mode of Action – Groups and uses.
- 31) Pesticide application methods – Principles and methods of application.
- 32) Pesticide appliances and Uses.
- 33) Hazards in the use of pesticides and environmental pollutions.
- 34) Safe handling of pesticides and Pesticide residue – Resistance – Resurgence.

Practical Schedule

- 1) Practicing the different methods of insect collection and preservation.
- 2) Observations and sketching of external features of grass hopper.
- 3) Observation and sketching of mouth parts of grass hopper, bug and butterfly.
- 4) Silkworm rearing – Improved methods and appliances.
- 5) Bee Keeping – Keeping appliances.
- 6) Study of symptoms and types of damage caused by pests.
- 7) Assessment of insect population, damage and crop losses in Rice & Cotton.
- 8) Assessment of insect population, damage and crop losses in Sugarcane and Pulses.
- 9) Mid Semester Examination.
- 10) Practicing of various pest control methods – Appliances and uses.
- 11) Mass culturing techniques for predators and parasitoids.
- 12) Practicing the use of pheromone, light, fish meal and yellow sticky traps.
- 13) Pesticides – Groups, formulations, label information and collection of pesticide samples.
- 14) Handling and practicing of spraying, dusting, soil application, whorl application, fumigation techniques.
- 15) Pesticide appliances – Types and use of high volume and low volume sprayers and dusters.
- 16) Preparation plant bio – pesticides (Neem oil, Neem seed kernel extract, Neem cake extract) – Safe handling of pesticides.
- 17) Orientation for final Practical Examination.

Reference Books

- 1) David, B.V. and V.V. Ramamurthy. 2017. *Elements of Economic Entomology*, Brillion Publishing, New Delhi, 398 p.
- 2) Pedigo, L.P. and M.E.Rice. 1996. *Entomology and Pest Management*. Prentice – Hall of India Pvt. Ltd, New Delhi. 812 p.
- 3) Dhaliwal, G.S. and R.Arora. 2001. *Integrated Pest Management – Concepts and approaches*. Kalyani publishers, New Delhi. 427 p.
- 4) Dandin, S.B., J.Jayaswal and K. Giridhar. 2003. *Hand Book of Sericulture Technologies*. Central Silk Board, Bangalore, 287 p.

PAT 123 : PRINCIPLES OF PLANT PATHOLOGY (1+1)

Objectives

The subject covers the knowledge on basic concepts of Plant Pathology and Principles of Plant Disease Management.

THEORY

Unit-I

Plant diseases – definition, causes of plant diseases – Fungi, Bacteria, Viruses and *Candidatus Spiroplasma fvb*, Abiotic diseases – categories of plant diseases – mode of spread – Environmental factors influencing diseases outbreak.

Unit-II

Principles of Plant Disease Management – Exclusion – Eradication – Immunization – Protection – Cultural Methods in Plant disease management – Biocontrol – *Trichoderma*, PGPR – Economics of the new technologies.

Unit-III

Beneficial fungi – mushroom, cultivation of Oyster and milky mushroom, Abiotic disorders of oyster and milky mushroom – Insect pests of oyster and milky mushroom and their management – Uses of mushroom – Nutritional and medicinal value – Utility.

Unit-IV

Characteristics of an ideal fungicide – Care in handling fungicides – Major groups – Formulation and Applications – Phytotoxicity – Precautions in using fungicides – Antibiotics in plant disease management.

Unit-V

Bio-technology and its application in disease management – Assessment of crop diseases and losses – Integrated Pest Management in plant disease control.

PRACTICAL

Identification of plant diseases – Assessment of crop losses; cultivation methods for oyster and milky mushroom. Fungicides – Groups – Copper – Sulphur – Mercury – Tin, Organo – phosphorus, miscellaneous groups – Systemic fungicides preparation of fungicidal solutions – Antibiotics – Fungicides for seed treatment – Foliar and Soil application – Biocontrol agents – *Trichoderma* spp. *Pseudomonas fluorescens*.

(Students should submit 50 preserved plant diseases specimens).

Theory Lectuer Schedule

- 1) General characters of Fungi, Bacteria, Virus and *Candidatus spiroplasma Fvb*, Abiotic diseases.
- 2) Categories of plant diseases.
- 3) Symptoms of Bacterial diseases: Wilt, Canker, Soft rot, Streak, Tumour, Gall, Blight and Leaf spot – Mode of entry and transmission.
- 4) Symptoms of viral diseases: Phyllody, Warming, Little leaf and Greening.
- 5) Role of weather factors: Temperature, Rainfall, Humidity.
- 6) Disease Surveillance – Disease Assessment – Disease Forecasting.
- 7) Survival and mode of spread of plant pathogens.
- 8) Exclusion: Quarantine – Diseases introduced from other countries to India – Phytosanitary certificate.
- 9) Mid Semester Examination.
- 10) Eradication – Physical methods and Cultural methods.
- 11) Eradication – Chemical methods and Biological methods.
- 12) Immunization: Immunity by different methods – Resistant varieties.
- 13) Protection: Cultural methods, Crop rotation, Mixed cropping and Chemical protection.
- 14) Classification of fungicide – Copper, Sulphur, Mercury, Systemic Fungicides and Antibiotics.
- 15) Methods of application of fungicides.
- 16) Methods of application of Bio control agents.
- 17) Cultivation of Oyster and milky mushrooms.

Practical Schedule

- 1) Root rots and wilts.
- 2) Downy mildews and powdery mildews.
- 3) Rusts and white Rust.
- 4) Smuts and sugar disease / (Ergot).
- 5) Leaf spots, Leaf blight and Anthracnose.
- 6) Symptoms of Bacterial diseases and Viral diseases.
- 7) Methods of application: Spraying and Dusting, Seed and Soil applications.
- 8) Study of various groups of fungicides.
- 9) Banana-corm injection and Root feeding in coconut.
- 10) Safety measures to be followed during handling fungicides.
- 11) Preparation of fungicides, Bordeaux mixture and Bordeaux paste.
- 12) Methods of Oyster and milky mushroom cultivation.
- 13) Survey and assessment of plant diseases.
- 14) Biological control of plant disease – Mass production of bio control agents.
- 15) Methods of application of biocontrol agents and commercial formulations.
- 16) Cross protection techniques in plant disease management and Management of crop disease by new products and various formulations.
- 17) Orientation for final Practical Examination.

Reference Books

- 1) Agrios, G.N. 2005. Plant Pathology. 5th Edition Academic Press, New York
- 2) Alice, D. and Jeyalakshmi, C. 2014. Plant Pathology, AE Publications, Coimbatore
- 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. Publications, Coimbatore.
- 5) Vidhyasekaran, P. 1993. Principles of Plant Pathology, CBS Publishers, New Delhi.

AGM 124 : ENERGY AND ENVIRONMENT (1+1)**Aim**

The emphasis of the course will be on the biosphere resource, sustainable agro ecosystem. To study the solid and liquid waste management and the pollution and environmental protection.

THEORY**Energy****Unit-I**

Introduction to Energy – Energy Resources and Forms of Energy – Renewable and Non-renewable Energy – Energy Scope. Solar Energy – Introduction – Application – Merits and Limitations of Solar Energy. Wind Energy – Introduction – Merits and Limitations of Wind Energy Conversion – Basic Principles of Wind Energy Conversion – Classification of WEC Systems.

Unit-II

Energy from Biomass – Technologies – Classification and types of Biogas Plants – Selection of site – Biogas from Plant Wastes – Problems related to Biogas Plants – Utilization of Biogas. Biomass – Gasification – Smokeless Chulas – Biochar.

Environmental Science**Unit-III**

Environment and different ecosystem and its structure, function – Ecosystems – Concepts – Productivity. Biosphere – Components and characteristics – Environmental pollution – Water pollution Sources – Impacts on environment – Waste water treatments – physical, chemical and biological treatments.

Unit-IV

Air Pollution – Particulate emission by industries and automobiles – Delhi smog – 2016 – Acid rain – Ozone hole – Global Warming – Causes, Effects and Control measures – Soil pollution – Sources and its impact on environment and management techniques.

Unit-V

Solid waste management – Sources – Composting and vermicomposting techniques – Maturity indices of composting – Ecological perspectives in Agriculture – Eco safe technologies – Environmental Acts and standards.

PRACTICAL**Energy**

Evaluation of solar cooker, solar water heater and solar dryer – Solar water pumping system. Water pumping wind mills. Biogas plants – KVIC & Deen Bhandu Models – Production of biogas and value added products. Performance & Evaluation of Biomass gasifier and improved chulas.

Environmental Science

Biodiversity assessment – Population measures – Flora and Fauna in an Agricultural ecosystem – Collection, sampling and preservation techniques in waste water – Waste water characterisation pH, EC, TDS – Effect of waste water on soil properties and crop growth – Waste water treatment – Physical and chemical methods (Column study and Alum flocculation) – Air pollution – Assessment of particulate matter accumulation in plants – Farm waste management Composting (windrow, heap and pit method) – Vermicomposting of farm and kitchen wastes

Theory Lecture Schedule

- 1) Introduction to Energy – Energy Resources and Forms of Energy – Renewable and Non – renewable energy – Energy Scope.
- 2) Solar Energy – Introduction – Application – Merits and Limitations of Solar Energy – Solar thermal energy utilization.
- 3) Solar photovoltaic system – street light, lantern and water pumping.
- 4) Wind Energy – Introduction – Merits and Limitations of Wind Energy Conversion – Classification of WEC Systems, water pumping wind mills.
- 5) Energy from Biomass – Technologies – Classification and types of Biogas Plants.
- 6) Selection of Site – Biogas from Plant Wastes – Problems related to Biogas Plants – Utilization of Biogas.
- 7) Biomass gasification – smokless chulas – Biochar in agriculture.
- 8) Environment and different ecosystem and its structure, function – Ecosystems – Concepts – Productivity. Biosphere – Components and characteristics.
- 9) Mid Semester Examination.
- 10) Environmental pollution – Water pollution Sources – Impacts on environment – Waste water treatments – physical, chemical and biological treatments.
- 11) Air Pollution – Particulate emission by industries and automobiles – Delhi smog 2016 – Acid rain – Ozone hole.
- 12) Green house gases – Global Warming – Causes, Effects and Control measures.
- 13) Soil pollution – sources and its impact on environment and management techniques.
- 14) Solid waste management – sources – Composting techniques.
- 15) Vermicomposting and Maturity indices of composting.
- 16) Ecological Perspective in Agriculture – Traditional farming methods – EcoSafe technologies in agriculture.
- 17) Environmental Acts and standards.

Practical Schedule

- 1) Evaluation of solar cooker, solar water heater and solar dryer.
- 2) Study on solar water pumping system.
- 3) Water pumping wind mills.
- 4) Biogas plants – KVIC Model.
- 5) Bio gas plants – Deen Bhandu Model.
- 6) Production of biogas and value added products.
- 7) Study on biomass gasification.
- 8) Performance & Evaluation of improved chulas.
- 9) Biodiversity assessment – Population measures – Flora and Fauna in an Agricultural ecosystem.
- 10) Collection, sampling and preservation techniques in waste water.
- 11) Waste water charecterisation pH, EC, TDS.
- 12) Effect of waste water on soil properties and crop growth.
- 13) Waste water treatment – Physical and chemical methods (Column study and Alum flocculation).
- 14) Air pollution – Assessment of particulate matter accumulation in plants.
- 15) Farm waste management Composting (windrow, heap and pit method) – Vermicomposting of farm and kitchen wastes.
- 16) Visit to a sewage treatment plant.
- 17) Orientation for final Practical Examination.

SAC 125 : SOIL NUTRIENT MANAGEMENT (1+1)**THEORY****Unit-I : Soil Fertility & Plant Nutrition**

Soil fertility – problems and prospects – plant nutrient elements – major, secondary and micronutrients – forms – functions – deficiency symptoms and corrective measures.

Unit-II : Fertilizers

Commercial fertilizers – classification – major nitrogenous fertilizers, phosphatic fertilizers – potassium fertilizers – sources and properties – Secondary and micronutrient fertilizers – different sources and properties – complex and mixed fertilizers – sources, advantages and disadvantages over straight fertilizers.

Compatibility of fertilizers and their reactions in soil – losses of nutrients from different fertilizers – fertilizer use efficiency (FUE) – Techniques to enhance FUE.

Unit-III : Manures

Definition – difference between manures and fertilizers – classification of manures – Bulky & concentrated – importance of manures in soil fertility management.

Unit–IV : Biofertilizers

Biofertilizers – importance in crop production and nutrient availability – methods of application of biofertilizers.

Plant growth regulators – definition – classification – their functions in plants.

Unit–V : INM & Soil Fertility Evaluation

INM – advantages, site specific nutrient management – effect of INM in maintaining soil health and quality in relation to sustainable agriculture.

Soil fertility evaluation – approaches – biological and chemical methods – soil testing – long term fertilizer experiment and its significance.

PRACTICAL

Identification and application methods of manures, fertilizers and biofertilisers. Working out fertilizer requirement – Foliar application of fertilizers and plant growth regulators – Identification of nutrient deficiencies/disorders in crops – Preparation of enriched FYM and Micronutrient mixtures. Visit to compost yard

Theory Lecture Schedule

- 1) Soil Fertility – Introduction.
- 2) Plant nutrients – Major nutrients, their forms, functions, deficiency symptoms and correction measures.
- 3) Plant nutrients – Secondary nutrients, their forms, functions, deficiency symptoms and correction measures.
- 4) Plant nutrients – Micro nutrients, their forms, functions, deficiency symptoms and correction measures.
- 5) Sources of nutrients – Manures and fertilizers and their classification.
- 6) Nitrogenous, Phosphatic and Potassic fertilizers.
- 7) Secondary nutrients fertilizers.
- 8) Micronutrient fertilizers.
- 9) Mid Semester Examination.
- 10) Complex and Mixed fertilizers.
- 11) Losses of nutrients from soil.
- 12) Techniques to enhance use efficiency of fertilizers.
- 13) Bio fertilizers – Methods of application and their importance in nutrient availability.
- 14) Plant growth regulators.
- 15) Integrated nutrient management (INM).
- 16) Soil fertility evaluation approaches.
- 17) Soil testing and fertilizer recommendations.

Practical Schedule

- 1) Collection and Identification of manures.
- 2) Collection and Identification of fertilizers.
- 3) Collection and Identification of biofertilizers.
- 4) Working out fertilizer requirement for crops using straight fertilizers.
- 5) Working out fertilizer requirement for crops using compound fertilizers.

- 6) Working out fertilizer requirement for INM and organic agriculture.
- 7) Identification of primary and secondary nutrient deficiencies/disorders in crops.
- 8) Identification of micronutrient deficiencies/disorders in crops.
- 9) Mid Semester Examination.
- 10) Foliar spray of nutrients.
- 11) Foliar spray of growth regulators.
- 12) Preparation of enriched FYM.
- 13) Preparation of Micronutrient mixtures.
- 14) Preparation of mixed fertilizers.
- 15) Preparation of slow release fertilizers – Neem coated Urea.
- 16) Visit to compost yard/Fertilizer mixing unit.
- 17) Orientation for final Practical Examination.

Reference Books

- 1) John Havlin, James Beaten, Samuel Tisdale and 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. 2006. Principles of Plant Nutrition, 5th Edn. Atlas Books and Periodicals, New Delhi
- 4) Miller, C.E. 2004. Soil Fertility. International Books and Periodical supply services, New Delhi
- 5) ISSS 2009. Fundamentals of Soil Science. 2nd Edn. N.N.Goswami et al., Eds. Published by Indian Society of Soil Science, New Delhi.

GPB 126 : BREEDING OF FIELD CROPS – I (1+1)

Objectives

To impart knowledge of specific techniques in crop improvement.

Unit-I : Pollination and Reproduction

Objectives and role of plant breeding – historical perspective – activities in Plant Breeding. Reproduction and pollination system in plants – Mechanisms promoting self and cross pollination in crop plants.

Unit-II : Mechanisms Promoting Cross Pollination

Self incompatibility – classifications – mechanisms – application – measures to overcome and limitations. Sterility – male sterility.

Unit-III : Male Sterile Systems

Introduction – classification – CMS, GMS, CGMS – inheritance and applications. Germplasm conservation and utilization.

Unit-IV : Breeding methods for Self Pollinated Crops

Breeding techniques for self pollinated crops – Pure line selection and Mass selection. Hybridisation and selection Pedigree method. Bulk method and Backcross method.

Unit-V : Breeding of Cereals, Pulses & Oil Seeds

Field crops – Importance – Classification – Agricultural and Industrial. Breeding methods for Rice, Small millets, Black gram, Greengram and Groundnut.

THEORY

Objectives and role of plant breeding – historical perspective – activities in Plant Breeding. Reproduction and pollination system in plants – Mechanisms promoting self and cross pollination in crop plants. Self incompatibility – classifications – mechanisms – application – measures to over come and limitations. Sterility – male sterility – introduction – classification – CMS,GMS,CGMS – inheritance and applications. Germplasm conservation and utilization.

Breeding techniques for self pollinated crops – Pure line selection and Mass selection. Hybridisation and selection Pedigree method Bulk method and backcross method. Field crops – Importance – Classification – Agricultural and Industrial. Breeding methods for Rice, Small millets, Black gram and Greengram and Groundnut.

PRACTICAL

Identification and Observation on the economic parts of important field crops. Visit to specimen plots. Herbarium collection of important field crops (25 nos). Floral structure of Poaceae and Papilionaceae – Pollination and reproduction in plants – Mechanisms. Breeder kit and its components – uses Studies on segregating generation and maintenance of records. Layout of different yield trials. Pollination, selfing, emasculation and crossing techniques in self pollinated crops like Rice, small millets, Blackgram, green gram and Groundnut.

Theory Lecture Schedule

- 1) Objectives and role of plant breeding – historical perspective – activities in Plant Breeding.
- 2) Modes of reproduction – sexual – asexual – self and cross fertilization – significance of pollination.
- 3) Mechanisms promoting self and cross pollination in crop plants.
- 4) Self incompatibility – classifications – mechanisms.
- 5) Self incompatibility – application – measures to over come and limitations.
- 6) Sterility – male sterility – introduction – classification – CMS,GMS,CGMS – inheritance and applications.
- 7) Germplasm conservation and utilization.
- 8) Mid Semester Examination.
- 9) Breeding techniques for self pollinated crops – Pure line selection and Mass selection.
- 10) Hybridisation and selection.
- 11) Pedigree method and Bulk method.
- 12) Backcross method.
- 13) Field crops – Importance – Classification – Agricultural and Industrial.
- 14) Breeding methods for Rice.
- 15) Breeding methods for Small millets.

- 16) Breeding methods for Black gram and Greengram.
- 17) Breeding methods for Groundnut.

Practical Schedule

- 1) Identification and Observation on the economic parts of important field crops. Visit to specimen plots.
- 2) Floral structure of Poaceae and Papilionaceae.
- 3) Pollination and reproduction in plants – Alternation of generation and life cycle.
- 4) Breeder kit and its components – uses.
- 5) Studies on segregating generation and maintenance of records.
- 6) Layout of different yield trials.
- 7) Breeding techniques in Rice.
- 8) Maintenance of A, B and R lines in Rice.
- 9) Breeding techniques in small millets.
- 10) Breeding techniques in Blackgram and Greengram.
- 11) Breeding techniques in Groundnut.
- 12) Studies on different wild species in crop plants and wide hybridization.
- 13) Germplasm preservation – conservation – records maintained in research stations.
- 14) Herbarium collection of important field crops (25 nos).
- 15) Visit to Ramiah gene bank, TNAU, Coimbatore.
- 16) Orientation for final Practical Examination.

Reference books

- 1) Singh, B.D. 2005. Plant Breeding – Principles and Methods, Kalyani Publishers, New Delhi.
- 2) Harihar Ram and Hari Govind Singh, 1994. Crop Breeding and Genetics, Kalyani Publishers, New Delhi.

AHS 127 : PRINCIPLES OF LIVESTOCK AND POULTRY MANAGEMENT (2+1)

Objectives

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 – Floor space requirement for livestock and poultry.

Unit-II : Dairy Management

Important breeds of cattle and buffaloes – Oestrus cycle and Artificial Insemination – Housing management – Systems of housing – Care and

management of young and adult stock – Clean milk production – Nutrition – Ration – Balanced ration – Classification of feed stuff – Importance of green fodder – Prevention and control measures of diseases.

Unit-III : 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-IV : Swine Management

Important breeds of swine – Care and management of young and adult stock – Creep feeding – Piglet anemia – Prevention and control measures of diseases.

Unit-V : Poultry Management

Important commercial layer and broiler strains – System of rearing – System of housing – Cage and deep litter – Broiler and layer management – Litter management – Feeding management – 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 oestrus 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 broiler and layer – Demonstration of dressing of chicken – Visit to poultry farm.

Theory Lecture Schedule

- 1) Significance of livestock and poultry in Indian economy.
- 2) Common nomenclatures used in Animal Husbandry.
- 3) Various systems of livestock production – extensive – semi intensive – intensive systems of farming.
- 4) Floor space requirement for livestock and poultry.
- 5) Important breeds of cattle – Red Sindhi, Kangeyam, Umblacherry, Jersey and Holstein Friesian.
- 6) Important breeds of buffaloes – Breed characteristics of Murrah and Surti.
- 7) Oestrus cycle.
- 8) Artificial Insemination.
- 9) Systems of housing – Single row system – Double row system – Head to Head and Tail to Tail – merits and demerits.
- 10) Care and management of new born calf.
- 11) Care and management of heifers, pregnant and lactating animals.
- 12) Clean milk production.
- 13) Nutrition – Ration – Balanced ration.
- 14) Classification of feed stuff – Dry matter requirement for cattle and buffalo.
- 15) Importance of green fodder.
- 16) Prevention and control measures of diseases.

- 17) Mid Semester Examination.
- 18) Introduction – Important breeds of sheep and goat.
- 19) Systems of rearing.
- 20) Care and management of young and adult stock.
- 21) Steaming up – Flushing.
- 22) Prevention and control measures of diseases.
- 23) Introduction – Important breeds of swine.
- 24) Care and management of young and adult stock.
- 25) Creep feeding – Piglet anemia.
- 26) Prevention and control measures of diseases.
- 27) Introduction – Important commercial layer and broiler strains.
- 28) Systems of rearing – All in all out – Multiple rearing – Housing systems – Deep litter and cage systems.
- 29) Brooder management.
- 30) Litter management.
- 31) Broiler management.
- 32) Layer management
- 33) Feeding management.
- 34) 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 oestrus 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 broiler and layer.
- 15) Demonstration of dressing of chicken.
- 16) Visit to poultry farm.
- 17) Orientation for final practical examination.

Reference 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.

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.

The Practical Class Schedule for the revised English course is as follows:

- 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) Final Practical 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

AGR 211 : AGRONOMY OF FIELD CROPS – II (1+1)

THEORY

Agronomic Practices including Climatic and Soil Requirement, Land Preparation – Seeds and Sowing – Season and varieties – Fertilizer management – Irrigation – Weed management – Intercultural operations – Harvesting – Cropping systems for Oilseeds, Commercial Crops, Forages and Green Manure Crops.

Unit-I : Agronomy of Oilseeds

Groundnut, sesame, sunflower, castor – Origin, geographic distribution, economic importance, soil and climatic requirements, season and varieties, cultural practices (from land preparation to harvest) and yield.

Unit-II : Agronomy of Commercial Crops

Cotton, Sugarcane, sugar beet, Tobacco and jatropha – Origin – geographic distribution, economic importance, soil and climatic requirements, season and varieties, cultural practices (from land preparation to harvest) and yield.

Unit-III : Agronomy of Forages

Guinea grass, Cumbu – Napier, Water grass, Buffalo grass, Elephant grass, Kolukkattai grass, Lucerne, Berseem, Desmanthus and cowpea – Origin geographic distribution – Economic importance, soil and climatic requirement, season and varieties, cultural practices and yield, Fodder preservation techniques.

Unit-IV : Agronomy of Green Manure Crops

Daincha, Sunnhemp Sesbania, Kalingi, Glyricidia, Subabul, Pungam, Poovarasu and Neem – Origin, economic importance, soil and climatic requirement, season and varieties, cultural practices and yield (Biomass and Seed). *In situ* incorporation of green manures.

PRACTICAL

Various methods of nursery preparation – Varieties for different seasons – Utilization of Bio – fertilizers in oil seed and commercial crops. Seed Treatment for different crops – Oilseeds, Commercial Crops and Green Manure Crops. Practicing Field Preparation and Sowing of Oilseeds and Commercial Crops. – Delinting of cotton – Sett Treatment and Planting Technique of Sugarcane – Hay and silage making – Studying cost of cultivation for important crops.

Lecture Schedule

- 1) Agronomic Practices for Groundnut.
- 2) Agronomic Practices for Sunflower.
- 3) Agronomic Practices for Sesamum and Castor.
- 4) Cropping System involving Oil Seeds.
- 5) & 6) Agronomic Practices for Cotton.
- 7) & 8) Agronomic Practices for Sugarcane.
- 9) Mid Semester Examination.
- 10) Cultivation practices for Sugarbeet.
- 11) Agronomic Practices for Tobacco.
- 12) Tobacco Curing Methods.
- 13) Cultivation practices for Jatropha.
- 14) Cropping System involving Commercial Crops.
- 15) Agronomic Practices for cereal forage crops – Guinea grass, Cumbu – Napier, Water grass, Buffalo grass, Elephant grass, Kolukkattai grass.
- 16) Agronomic practices for leguminous forage crops – lucerne, berseem, desmanthus and cowpea.
- 17) Agronomic practices for green manure crops and green leaf manure.

Practical Schedule

- 1) Establishing crop cafeteria involving major crops.
- 2) Identification of crops and varieties of oilseeds, sugar, fibre, green manures and green leaf manures and forages.
- 3) Working out nursery area requirement for transplanted crops.
- 4) Nursery techniques for major field crops.
- 5) Working out seed rate for major field crops.
- 6) Practicing main field preparation for irrigated lowland and upland.
- 7) Practicing of seed treatment techniques for major field crops.
- 8) Practicing different sowing methods for irrigated uplands.
- 9) Planting techniques for sugarcane.
- 10) Working out plant population for major field crops.
- 11) Work out LAI for major field crops.
- 12) After cultivation practices in cotton.
- 13) After cultivation practices in sugarcane.
- 14) Assessment of maturity for important field crops.

- 15) Observation on growth and yield parameters and estimation of yield of oil seeds, fibres, sugars and commercial crops.
- 16) Working out cost of cultivation for important crops.
- 17) Final Practical Examination.

Reference Books

- 1) Chidda Singh. 2010. *Modern Techniques of Raising Field Crops*. Oxford and IBH Publishing, Co.Pvt. Ltd. New Delhi.
- 2) Crop Production Guide. 2012. *Directorate of Agriculture*, Chennai and Tamil Nadu Agricultural University, Coimbatore.
- 3) Singh. S.S. 2002. *Crop Management under Irrigated and Rainfed Conditions*. Kalyani Publishers, New Delhi.

AGR 212 : CROP PRODUCTION – I (0+2)

It is designed to learn and acquire skill in cultivation of rice crop from seed to seed for which they will be allotted a piece of land individually. Each student will record all the growth and yield parameters continuously through the course of the semester, and work out cost of cultivation. During this process, post harvest technology will be studied by the students.

Practical Schedule

- 1) Introduction.
- 2) Preparation of calendar of operation for cultivation of crop.
- 3) Lay out and field preparation.
- 4) Nursery preparation and techniques viz., SRI, conventional methods etc.
- 5) Working out quantity and application of organic manures in nursery and main field.
- 6) Calculation of seed rate.
- 7) Methods of seed treatment and its importance.
- 8) Seed treatment with bio-fertilizers and fungicides (requirement calculation).
- 9) Work out fertilizer requirements for nursery and main field.
- 10) & 11) Calculation and different methods of application of pre and post emergence herbicides.
- 12) & 13) Transplanting techniques viz., conventional, SRI methods etc.
- 14) Assessment of plant population per unit area.
- 15) After cultivation practices.
- 16) Practicing irrigation at different stages.
- 17) Mid Semester Examination.
- 18) Recording growth parameters viz., plant height, tiller number, etc.,
- 19) Assessment of LAI in the field.
- 20) Top dressing and foliar spray of fertilizers with calculated quantity.
- 21) Identification and management of pests and diseases.
- 22) Observation on nutrient deficiency symptoms and their management.
- 23) Study of growth phases of rice crop.

- 24) Assessment of yield parameters.
- 25) Calculation of theoretical yield.
- 26) Assessment of maturity, physiological maturity and senescence.
- 27) Plot-wise yield estimation – actual yield.
- 28) Harvesting.
- 29) Threshing.
- 30) Cleaning and winnowing.
- 31) Cost of agricultural inputs.
- 32) Working out cost of cultivation.
- 33) Value addition.
- 34) By-products utilization.

Reference Books

- 1) Chidda Singh.1997. *Modern Techniques of Raising Field Crops*. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
- 2) *Crop Production Guide*. 2005. Directorate of Agriculture, Chennai and Tamil Nadu Agricultural University, Coimbatore.
- 3) ICAR 2006. *Hand Book of Agriculture*. Indian Council of Agriculture, New Delhi.

AEN 213 : CROP PESTS AND THEIR MANAGEMENT (1+2)

Objective

To impart detailed knowledge on damage symptoms, life stages and management practices of key insect and non – insect pests on major crops

THEORY

Damage symptoms, life cycle and management practices of insect and non insect pests of the following crops.

Unit-I : Cereals, millets & pulses

Rice, Sorghum, Maize, Cumbu, Ragi, Pulses.

Unit-II : Oilseeds, cotton & sugarcane

Groundnut, Castor, Gingelly, Sunflower, Cotton, Sugarcane.

Unit-III: Green manures & vegetables

Sunnhemp, Sesbania, Glyricidia, Subabul, Brinjal, Tomato, Bhendi, Cucurbits, Crucifers, Amaranthus, Moringa, Curry-leaf, Tapioca, Chillies, Onion, Garlic, Coriander.

Unit-IV : Fruits

Mango, Citrus, Banana, Sapota, Guava, Cashew, Pomegranate, Jack, Custard apple, Papaya, Ber, Coconut, Arecanut, Turmeric, Betelvine.

Unit-V: Plantation crops, spices, flower crops & stored products

Coffee, Tea, Cardamom, Pepper, Flower crops, Pests of stored materials and their management. Rodents and their management.

PRACTICAL

Identification of the damage symptoms, life stages of important pests in different field crops, horticultural crops and stored products, collection and

preservation of important pests of field crops, horticultural crops and stored products. Rodent damage and their management. IPM practices for Rice, Cotton, Sugarcane, Groundnut, Pulses, Vegetables and Fruits, Plantation Crops and Spices.

Assignment : Students should complete rearing of 10 insect pests and also to submit 50 adult insect pests.

Theory Lecture Schedule

Damage, life cycle, stages and management of insect and non-insect pests (major) of the following crops.

- 1) Rice.
- 2) Sorghum, Maize, Cumbu and Ragi.
- 3) Pulses – Red gram, Green gram, Lablab and Black gram.
- 4) Groundnut, Castor, Gingelly and Sunflower.
- 5) Cotton.
- 6) Sugarcane.
- 7) Sunnhemp, Sesbania, Glyricidia and Subabul.
- 8) Brinjal, Tomato and Bhendi.
- 9) Mid Semester Examination.
- 10) Cucurbits, Crucifers, Amaranthus, Moringa and Curry leaf.
- 11) Tuber crops – Potato, Sweet Potato, Tapioca; Chillies, Onion, Garlic and Coriander.
- 12) Mango, Citrus, Banana, Sapota, Guava and Pomegranate.
- 13) Cashew, Jack, Custard apple, Papaya and Ber.
- 14) Coconut, Arecanut, Turmeric and Betelvine.
- 15) Coffee, Tea, Cardamom, Pepper.
- 16) Rose, Crossandra, Jasmine, Chrysanthemum and Tuberoses.
- 17) Stored commodities and scientific method of storage.

PRACTICAL SCHEDULE

Field identification of damage symptoms, collection and preservation of important pests of the following crops.

- 1) Rice – Borers and Defoliators.
- 2) Rice – Sucking Pests.
- 3) Sorghum – Maize – Cumbu – Borers and Sucking Pests.
- 4) Red gram – Black gram – Borers and Sucking Pests.
- 5) Green gram – Lablab – Borers and Sucking Pests.
- 6) Groundnut and Sunflower.
- 7) Gingelly and Castor.
- 8) Cotton – Sucking Pests.
- 9) Cotton – Boll Worms and Defoliators.
- 10) Sugarcane – Borers and Sucking pests.
- 11) Sugarcane – Subterranean Pests.
- 12) Sunnhemp, Sesbania, Glyricidia and Subabul.

- 13) Brinjal and Tomato.
- 14) Bhendi and chillies.
- 15) Cucurbits and Crucifers.
- 16) Amaranthus, Moringa, and Curry leaf.
- 17) Mid Semester Examination.
- 18) Tubers – Potato, Sweet potato, Tapioca.
- 19) Onion, Turmeric and Garlic.
- 20) Cardamom, Pepper, Coriander and Betelvine.
- 21) Mango and Banana.
- 22) Sapota, Guava, Citrus, Cashew.
- 23) Pomegranate, Jack, Custard apple, Papaya and Ber.
- 24) Coconut and Arecanut.
- 25) Coffee, Tea.
- 26) Rose, Crossandra, Jasmine, Chrysanthemum and Tuberose.
- 27) Rodent damage and their management.
- 28) Storage pests and their management .
- 29) IPM practices in Rice & Pulses.
- 30) IPM practices in Cotton & Sugarcane.
- 31) IPM practices in Oilseeds.
- 32) IPM practices in Fruits & Vegetables.
- 33) IPM practices in Plantation crops and spices.
- 34) Orientation for final practical examination.

Reference Books

- 1) David, B.V. and V.V. Ramamurthy. 2017. *Elements of Economic Entomology*, Brillion Publishing, New Delhi. 398 p.
- 2) Awasthi, V.B. 2007. *Agricultural Insect Pests and their Control*, Scientific publishers (India), Jodhpur, 267 p.
- 3) Dhaliwal, G.S. and Ramesh Arora. 2004. *Integrated pest management Concepts and Approaches*, Kalyani Publishers, Ludhiana, 427 p.
- 4) Regupathy, A. and R.Ayyasamy. 2013. *A Guide on Crop Pests*. Namrutha Publications, Chennai, 368 p.

PAT 214 : CROP DISEASES AND THEIR MANAGEMENT (1+2)

Objective

The subject covers etiology, symptoms, epidemiology, mode of spread, survival and integrated management of important diseases due to fungi, bacteria, viruses, phytoplasma, spiroplasma, phanerogamic parasites and non – parasitic causes of the following crops.

THEORY

Unit-I

Cereals – Rice, Sorghum, Maize, Cumbu and Ragi, Minor millets.

Pulses – Red gram, Black gram, Green gram, Bengal gram, Cowpea and Lablab.

Unit-II

Oil seeds – Groundnut, sesame, Sunflower and Castor, safflower.

Cash crops – Cotton, Sugarcane, Tobacco and Betelvine.

Unit-III

Fruits – Mango, Banana, Grapevine, Sapota, Pomegranate and Papaya.

Unit-IV

Vegetables – Potato, Tomato, Chillies, Brinjal, Bhendi, Cucurbits, Crucifers, Onion and Garlic.

Unit-V

Plantation crops – Coffee, Tea, Rubber, Coconut and Arecanut.

Spices – Turmeric, Pepper, Cardamom, Coriander and Ginger.

Flowers – Rose, Jasmine, Crossandra and Chrysanthemum.

PRACTICAL

Identification of symptoms of major diseases of Cereals, Pulses, Oil seeds, Cash crops, Fruits, Vegetables, Plantation crops, Spices and Flowers. Collection and preservation of diseased specimens.

Assignment : Students should submit 50 preserved plant disease specimens.

Lectuer Theory Schedule

- 1) Rice, Sorghum, wheat.
- 2) Maize, Cumbu, Ragi, minor millets.
- 3) Red gram, Black gram, Green gram, Bengal gram, cowper, Lablab.
- 4) Groundnut, sesame, safflower.
- 5) Sugarcane, Tobacco, Betelvine.
- 6) Sunflower, Castor, Cotton.
- 7) Mango, Banana, Grapevine.
- 8) Sapota, Pomegranate, Papaya.
- 9) Mid Semester Examination.
- 10) Tomato, Chillies, Brinjal.
- 11) Bhendi, Cucurbits, Crucifers.
- 12) Onion, Garlic, Potato.
- 13) Coffee, Tea, Rubber.
- 14) Coconut, Arecanut.
- 15) Turmeric, Pepper, Cardamom, Coriander, Ginger.
- 16) Rose, Jasmine, Crossandra, Chrysanthemum.
- 17) Important viral diseases, their vector and control measures.

Practical Schedule

- 1) Rice, wheat.
- 2) Sorghum.
- 3) Maize.
- 4) Cumbu.
- 5) Ragi, minor millets.
- 6) Red gram.

- 7) Bengal gram.
- 8) Black gram.
- 9) Green gram.
- 10) Cowpea.
- 11) Lablab.
- 12) Groundnut.
- 13) Sesame.
- 14) Sunflower, safflower.
- 15) Castor.
- 16) Cotton.
- 17) Sugarcane.
- 18) Tobacco.
- 19) Mango.
- 20) Sapota.
- 21) Pomegranate.
- 22) Banana.
- 23) Grapevine.
- 24) Papaya.
- 25) Tomato.
- 26) Chilli.
- 27) Brinjal.
- 28) Bhendi.
- 29) Cucurbits.
- 30) Crucifers.
- 31) Potato, Turmeric ,Ginger, Coffee, Tea, Rubber.
- 32) Coconut and Arecanut.
- 33) Diseases of major flower crops.
- 34) Orientation for final practical examination.

Reference Books

- 1) Agrios, G.N. 2005. Plant Pathology. Academic Press, New York.
- 2) Chaube H.S and Pandhir. 2005. Crop diseases and their management. Prentice hall of India Pvt. Ltd. New Delhi.
- 3) Darwin Henry, L., and H. Lewin. 2011. Crop Diseases – Identification, Treatment and Management. New India Publishing Agencies, New Delhi.
- 4) Rangaswami, G. and Mahenderan , A, 2005. Diseases of Crop plants in India. Prentice Hall of India Pvt. Ltd., New Delhi.
- 5) Alfred Steferud, 2005, Diseases of Vegetable Crops. Biotech Books, New Delhi.

GPB 215 : BREEDING OF FIELD CROPS – II (1+1)

Objective

To impart knowledge about various breeding methods in various field crops.

Unit-I : Heterosis Breeding

Breeding techniques for Cross Pollinated and Often Cross Pollinated Crops – Mass Selection, Heterosis Breeding – Development of Hybrids – Single Cross – Double Cross and Poly Cross.

Unit-II : Breeding of Cross Pollinated Crops

Synthetics and composites for crops like Maize, Cumbu, Redgram, Cotton, Castor, Sunflower, Coconut. Breeding Methods for vegetatively propagated crops.

Unit-III : Breeding Clonally Propagated Crops

Clonal Selection – Hybridization and selection for crops like Sugarcane, Tapioca and Potato.

Unit-IV : Mutation Breeding

Mutation in Crop Improvement – Mutation – types – mutagens – breeding procedure – applications – achievements.

Unit-V : Introduction to Polyploidy of Wide Hybridization

Polyploid in Crop Improvement – Wide hybridization – barriers and techniques for overcoming barriers – utilization – Inter Specific Hybridization.

PRACTICAL

Identification and Observation on the economic parts of important field crops. Visit to specimen plots. Herbarium Collection of the important field crops (25 Nos). Anthesis, Pollination, Selfing, Emasculation and Crossing Techniques in crops like, Maize, Cumbu, Redgram, Castor, Sunflower, Coconut, Cotton, Sugarcane, Tapioca. Trails involved in release of a Variety – RYT, PRYT, PYT, MLT, ART, Different classes of seeds – Nucleus Seed – Breeder Seed, Foundation Seed and Certified Seed.

Theory Lecture Schedule

- 1) Field Crops – Importance – Classification – Agricultural and Industrial.
- 2) Breeding Techniques for Cross Pollinated and Often Cross Pollinated Crops.
- 3) Mass Selection.
- 4) Heterosis Breeding.
- 5) Development of Hybrids – Single Cross.
- 6) Double Cross and Poly Cross.
- 7) Synthetics and composites for Maize.
- 8) Synthetics and composites for Cumbu, Redgram, Cotton, Castor, Sunflower.
- 9) Mid Semester Examination.
- 10) Breeding Methods for vegetatively propagated crops.
- 11) Clonal Selection.
- 12) Hybridization and selection for Sugarcane.
- 13) Hybridization and selection for Tapioca.
- 14) Hybridization and selection for potato.
- 15) Mutation in crop improvement.
- 16) Polyploid in Crop Improvement.

- 17) Wide hybridization.
- 18) Inter Specific Hybridization.

Practical Schedule

- 1) Identification and Observation on the economic parts of important field crops. Visit to specimen plots.
- 2) Selfing techniques.
- 3) Emasculation and Pollination techniques in cross pollinated crops.
- 4) Breeding techniques in Sorghum.
- 5) Breeding techniques in Maize.
- 6) Breeding techniques in Cumbu.
- 7) Breeding techniques in Redgram.
- 8) Breeding techniques in Castor.
- 9) Breeding techniques in Sunflower.
- 10) Breeding techniques in Coconut.
- 11) Breeding techniques in Cotton.
- 12) Breeding techniques in Sugarcane.
- 13) Breeding techniques in Tapioca.
- 14) Trails involved in release of a Variety – RYT, PRYT, PYT, MLT, ART.
- 15) Different classes of seeds – Nucleus Seed – Breeder Seed, Foundation Seed and Certified Seed.
- 16) Orientation for final practical examination.

Reference Books

- 1) Singh, B.D. 2005. Plant Breeding – Principles and Methods, Kalyani Publishers, New Delhi.
- 2) Harihar Ram and Hari Govind Singh, 1994. Crop Breeding and Genetics, Kalyani Publishers, New Delhi.

AEC 216 : AGRICULTURAL ECONOMICS AND MARKETING (2+1)

Objective

This course aims at imparting knowledge on various aspects of agricultural economics, farm management, agricultural finance and agricultural 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 : Concepts in Agricultural Economics

Definitions of Economics – Wealth, Welfare, Scarcity and Growth. Divisions of Economics: Micro economics and Macroeconomics. Agricultural Economics – Meaning, importance and scope – Importance of agriculture in rural economy – Role of agriculture in national economy – Problems of rural economy – Sectors of economy – Primary, Secondary and Tertiary.

Unit-II : Farm Management

Farm Management: Definition and objectives – Scope of farm management – Types of farming: Specialized, Diversified and Mixed farming. Systems of farming – state farming, collective farming, cooperative farming, capitalistic farming. Farm planning – Importance – Characteristics of good farm plan – Farm planning procedure. Farm budgeting – Definition and types – Partial budgeting and Complete budgeting.

Unit-III : Agricultural Finance

Agricultural finance and credit – Definition, importance, nature and scope. Classification of credit – Sources of rural finance – Institutional and non – institutional. Rural financing institutions – Government, Cooperatives and nationalized commercial banks, Regional rural banks and Land Development banks, private money lenders. Establishment of NABARD and its role – Multi agency approach and Service area approach.

Unit-IV : Agricultural Marketing

Concepts and Definition of marketing – Scope and importance – Characteristics of agricultural commodities. Classification of markets – Market forces – Demand and Supply – Marketing channel – Marketing costs – Marketing margins – Price spread – Marketed surplus and Marketable surplus. Role of Commission on Agricultural Costs and Prices – MSP. Price support programmes – Buffer stock operation.

Unit-V : Marketing Functions and Institutions

Marketing functions – Packaging – Transportation – Grading and standardization – Warehousing – Processing – 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 agricultural commodities. Marketing of agricultural inputs – Market information and intelligence – AGMARKNET, DEMIC, DMI – Usage of market information.

PRACTICAL

Assessment of resource endowments in the farm. Cost of cultivation and Cost of production of agricultural and horticultural crops. Farm business analysis – Preparation of farm plan – Farm records and accounts: Usefulness, types of farm records: farm production records and farm financial records. – Farm inventory analysis: Valuation of assets by different methods. Depreciation: Methods of calculating depreciation. Farm financial statements – Net worth Statement, Income statement. Farm budgeting – Complete budget and partial budget. Loan repayment methods – Primary Agricultural Co – operative Bank (PACB) – Contract farming – Procedure for its establishment. Marketing institutions : Farmers' market – Village shandies – Wholesale markets – Estimation of marketing costs, marketing margins and price spread – Commission mundies – Regulated market – AGMARK – Cooperative Agricultural Marketing Societies – State Agricultural Marketing Boards – NAFED – TANFED – FCI.

Lecture Schedule

- 1) Definitions of Economics – Wealth, Welfare, Scarcity and Growth.
- 2) Divisions of Economics: Micro economics and Macroeconomics.

- 3) Agricultural Economics – Meaning, importance and scope.
- 4) Importance of agriculture in rural economy.
- 5) Role of agriculture in national economy.
- 6) Problems of rural economy – Sectors of economy – Primary, Secondary and Tertiary.
- 7) Farm Management : Definition and objectives – scope of farm management.
- 8) Types of farming: Specialized, Diversified and Mixed farming.
- 9) Systems of farming – State farming, Collective farming, Cooperative farming, Capitalistic farming.
- 10) Farm planning – Importance – Characteristics of good Farm plan – farm planning procedure.
- 11) Farm budgeting – Definition and types – Partial budgeting and Complete budgeting.
- 12) Agricultural finance and credit – Definition, importance, nature and scope.
- 13) Classification of credit – Sources of rural finance – Institutional and non – institutional.
- 14) Rural financing institutions – Government, cooperatives.
- 15) Nationalized commercial banks.
- 16) Regional rural banks and Land development banks, private money lenders.
- 17) Mid Semester Examination.
- 18) Establishment of NABARD and its role – Multi agency approach and Service area approach.
- 19) Concepts and definition of marketing – scope and importance – Characteristics of agricultural commodities.
- 20) Classification of markets – Market forces – Demand and Supply Marketing channel.
- 21) Marketing costs – Marketing margins – Price spread.
- 22) Marketed surplus and Marketable surplus.
- 23) Role of Commission on Agricultural Costs and Prices – MSP.
- 24) Price support programmes – Buffer stock operation.
- 25) Marketing functions – Packaging – Transportation – Grading and standardization.
- 26) Warehousing – Processing – Cold storage.
- 27) Marketing agencies and institutions – Cooperative marketing societies.
- 28) Role of regulated markets – NAFED – TANFED – NHB.
- 29) Role of specialized agencies – FCI.
- 30) CWC, SWC in marketing of agricultural commodities.
- 31) Marketing of agricultural inputs – Seeds, fertilizer, pesticides and machineries.
- 32) Market information and intelligence – AGMARKNET.
- 33) DEMIC, DMI – Usage of market information.

Practical Schedule

- 1) Farm visit to assess the resource endowments.
- 2) Cost of cultivation and cost of production of agricultural crops.
- 3) Cost of cultivation and cost of production of horticultural crops.

- 4) Preparation of farm plan and layout.
- 5) Visit to agricultural Farm to study Farm Records and Accounts: Usefulness, Types of farm records: farm production records and Farm financial records.
- 6) Farm inventory analysis: Valuation of assets by different methods.
- 7) Depreciation : Methods of computing depreciation.
- 8) Preparation and analysis of Net worth Statement and Profit and Loss statement.
- 9) Preparation of complete budget and partial budget.
- 10) Loan repayment methods.
- 11) Visit to a Primary Agricultural Co-operative Bank (PACB) to study its role, functions and procedures for availing loan.
- 12) Contract farming – Procedure for its establishment.
- 13) Visit to Farmers' market / Village Shandies/ Commission mundies and study the marketing of agricultural commodities and marketing channel.
- 14) Estimation of marketing costs, marketing margins and price spread.
- 15) Visit to Regulated market / AGMARK.
- 16) Visit to Cooperative Agricultural Marketing Societies. State Agricultural Marketing Boards / NAFED / TANFED / FCI.
- 17) Orientation for final practical examination.

Reference Books

- 1) Acharya S.S. and N.L.Agarwal. 2015. Agricultural Marketing in India. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
- 2) Johl, S.S & Kapoor, T.R. 2006. Fundamentals of Farm Business Management. Kalyani Publishers. Ludhiana.
- 3) Muniraj, R. 1987. Farm Finance for Development. Oxford & IBH. 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, 2015, Agricultural Economics, Oxford & IBH Publishing Co. Pvt. Ltd.,. New Delhi.
- 6) Subba Reddy, S and P. Raghu Ram. 2011. Agricultural Finance and Management. Oxford & IBH. New Delhi.

CAG 217 : COMMERCIAL AGRICULTURE – I

SI. No.	SUBJECT CODE	SUBJECT NAME	CREDIT
1.	CAG AGR 217	Production of Liquid Organic Manures	0+2
2.	CAG ENT 217	Commercial Production Of Bio – Control Agents	0+2
3.	CAG PAT 217	Commercial Production of Spawn and Mushroom	0+2
4.	CAG GPB 217	Commercial Seed Production	0+2
5.	CAG HOR 217	Nursery Technology	0+2

1. CAG AGR 217 : PRODUCTION OF LIQUID ORGANIC MANURES (0+2)

This course is designed to acquire skill in production of different liquid organic manures and its application technique for generating rural employment and enhancing crop productivity. Production technology for liquid organic manure *viz.*, Panchagavya, amirthakaraisal, dasagavya, fish amino acid, Jeevamirtham, agniastra, vermiwash, beejamirtha, varahgunabajalam, biol, amrut pani.

Practical Schedule

- 1) Introduction – concepts of liquid organic manure.
- 2) Scope of liquid organic manure.
- 3) Survey about input availability for liquid organic manure preparation.
- 4) Introduction and collection of raw material for panchagavya.
- 5) Production of panchagavya.
- 6) Introduction and collection of raw material for amirthakaraisal.
- 7) Production of amirthakaraisal.
- 8) Introduction and collection of raw material for dasagavya.
- 9) Production of dasagavya.
- 10) Introduction and collection of raw material for fish amino acid.
- 11) Production of fish amino acid.
- 12) Introduction and collection of raw material for Jeevamirtham.
- 13) Production of Jeevamirtham.
- 14) Introduction and collection of raw material for agniastra.
- 15) Production of agniastra.
- 16) Introduction and collection of raw material for vermiwash.
- 17) Mid Semester Examination.
- 18) Production of vermiwash.
- 19) Introduction and collection of raw material for beejamirtha.
- 20) Production of beejamirtha.
- 21) Introduction and collection of raw material for varahgunabajalam.
- 22) Production of varahgunabajalam.
- 23) Introduction and collection of raw material for biol.
- 24) Production of biol.
- 25) Introduction and collection of raw material for amrut pani.
- 26) Production of amrut pani.
- 27) Calculation of stock solution and liquid organic manure requirement.
- 28) Crop performance study.
- 29) Recording the pest and disease occurrence.
- 30) Working out economics.
- 31) Study on quality of produce.
- 32) Visit to nearby liquid organic manure production centre.
- 33) Project preparation.
- 34) Orientation for final practical examination.

2. CAG ENT 217 : COMMERCIAL PRODUCTION OF BIO-CONTROL AGENTS (0+2)

PRACTICAL

Introduction to bio-control agents – Importance – History and development – classical examples of bio-control agents – Role in pest management – Categories of bio-control agents. Setting up a bio-control laboratory. Mass culture of tobacco caterpillar (*Spodoptera litura*) and gram pod borer (*Helicoverpa armigera*) – synthetic diet-mass production of SInPV and HaNPV. Mass production of *Trichogramma* spp., *Chrysoperla*, coccinellid predators, *Beauveria*, *Metarhizium* and Entomopathogenic nematodes. Project preparation.

Practical Schedule

- 1) Bio-control – importance – history – successful bio – control programmes.
- 2) Role of bio – control agents in pest management. Basic facilities required for setting up a bio-control laboratory.
- 3) Rearing host insects for pathogen production – facilities and materials required for rearing the insect on natural host and synthetic diet.
- 4) Acquiring mother culture of *Spodoptera litura* and *Helicoverpa armigera*. Conditioning for egg laying.
- 5) Collection of eggs – disinfecting eggs – preparation for hatching.
- 6) Synthetic diet preparation for host insects.
- 7) Releasing hatched out larvae in synthetic diet or natural hosts.
- 8) Maintaining the culture – sanitation and cleanliness of rearing unit.
- 9) Harvesting pupae and preparation of adult emergence cage.
- 10) Preparation for mating cages – Releasing adults with oviposition substrate. Collection of eggs.
- 11) Acquiring nucleus NPV inoculum – inoculation of NPV in natural host plant/ synthetic diet.
- 12) Culturing the virus – inoculated larvae. Harvesting viroseed larvae.
- 13) Preparation of virus suspension for field application and maintaining nucleus virus culture.
- 14) Mass culturing of *Corcyra cephalonica* – preparation of sorghum/ cumbu grain trays for feeding the caterpillars. Releasing eggs in the grains in sulphur treated broken grains.
- 15) Preparation of mating cages. Sanitation of rearing unit. Control of parasitoids
- 16) Collection of adults, releasing in mating cages and collection of eggs.
- 17) Mid Semester Examination.
- 18) Separation of eggs – cleaning – sterilization – preparation of egg cards. Acquiring nucleus culture of *Trichogramma* spp.
- 19) Parasitizing the egg cards with nucleus culture. Sanitation of culture room.
- 20) Collection of parasitized egg cards – Field release.
- 21) Mass rearing of predatory coccinellid. Field collection of coccinellids – preparation of prey insect – field collection of mealy bugs and culturing on pumpkin.
- 22) Insect cages for rearing – release of coccinellids on mealy bugs and culturing the predator.

- 23) Harvesting beetles – field release. Maintaining the mother culture for further culturing.
- 24) Bio-control agents for plant pathogens – *Trichoderma viride* and *Pseudomonas fluorescens*. Laboratory requirement – materials required.
- 25) Acquiring *Trichoderma* culture – aseptic condition for a maintaining pure culture – media preparation.
- 26) Inoculation of nucleus culture in the media. Culture room sanitation and conditioning. Observation on growth characteristics.
- 27) Harvesting the culture – preparation for field application – formulation – field application.
- 28) *Pseudomonas fluorescens*. Acquiring culture – media preparation – inoculation.
- 29) Laboratory sanitation and maintenance of culture. Observation on growth characteristics.
- 30) Harvesting the culture – preparation for field application – formulation – field application.
- 31) Packing the formulations of *Trichoderma viride* and *Pseudomonas fluorescens*. Storage for field use.
- 32) Entomopathogenic nematodes – identification – Acquiring nucleus culture – Method of mass multiplication in insect hosts. Field release procedures.
- 33) Cost analysis – Project preparation for setting a commercial laboratory.
- 34) Orientation for final practical examination.

3. CAG PAT 217 : COMMERCIAL PRODUCTION OF SPAWN AND MUSHROOM (0+2)

PRACTICAL

Mushroom – introduction, importance – present production and trade, scope for export, markets for mushroom and mushroom products – Mushroom morphology: common edible mushrooms – *Pleurotus*, *Calocybe* – poisonous mushrooms – Laboratory techniques: equipments used, sterilization of glassware, media preparation, pure culture techniques, sub – culturing and storage. Spawn: types of spawn, mother spawn and bed spawn. Cultivation: Oyster mushroom, Milky mushroom – Problems in cultivation: weed moulds, diseases, pests and abiotic disorders – Uses of mushroom : as food, nutraceutical and pharmaceutical values, composting coir – pith and other agro – wastes – Post harvest technology: methods of preservation and value addition Cost analysis and Project preparation.

Practical Schedule

- 1) Introduction to mushroom science, importance, contribution from related fields, global production, domestic and international trade for mushrooms and mushroom products.
- 2) Mushroom morphology – Identification of common edible and Poisonous mushrooms.
- 3) Equipments used in mushroom laboratory, physical and chemical sterilization techniques.
- 4) Preparation of culture media.

- 5) Pure culture technique – tissue isolation.
- 6) Sub-culturing.
- 7) Short term and long term preservation of mushroom cultures.
- 8) Mother spawn production – demonstration.
- 9) Mother spawn production – self learning.
- 10) Bed spawn production – demonstration.
- 11) Bed spawn production – self learning.
- 12) Oyster mushroom cultivation – important species and varieties.
- 13) Oyster mushroom cultivation – Cultural requirements.
- 14) Oyster mushroom cultivation – Bed preparation.
- 15) Observation on spawn run, cropping room requirements and maintenance.
- 16) Harvesting and aftercare of oyster mushroom beds.
- 17) Aftercare of oyster mushroom beds.
- 18) Milky mushroom – special features, important species and varieties.
- 19) Milky mushroom production – cultural requirements.
- 20) Substrate preparation – quality analysis.
- 21) Casing soil preparation – Casing soil characters and purpose of casing.
- 22) Milky mushroom production – bed preparation.
- 23) Milky mushroom production – observations on spawn running and cropping .
- 24) Harvesting of milky mushrooms and after care.
- 25) Constraints in mushroom production – weed moulds infesting spawn and their management.
- 26) Weed moulds mushroom infesting mushroom beds and their management.
- 27) Diseases of oyster and milky mushrooms.
- 28) Abiotic disorders of oyster and milky mushroom.
- 29) Insect pests of oyster and milky mushroom and their management.
- 30) Uses of mushrooms – Nutritional and medicinal value.
- 31) Recipe preparation with oyster and milky mushrooms, drying, caning and value added mushroom products.
- 32) Methods of composting coir pith and other agro – wastes.
- 33) Cost analysis and project preparation – sources of finance – acquisition.
- 34) Orientation for final practical examination.

Reference Books

- 1) Aneja, K.R. 1996. Experiments in Microbiology, Plant Pathology, Tissue Culture and Cultivation of Mushroom, Wishwa Prakasham, New Delhi.
- 2) Bahl, N. 2000. Hand Book of Mushrooms. Oxford & IBH Publishing Co., Pvt., Ltd., New Delhi.
- 3) Chauhan, N.M., Gagre, N. K. and Prajapati, V.P. 2013. Scientific Cultivation of Mushroom. Bio – tech 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) Ram Dutta. 2007. Advances in Mushroom Science. Satish Serial Publishing House, New Delhi.

4. CAG GPB 217 : COMMERCIAL SEED PRODUCTION (0+2)

Objective

To impart knowledge about seed testing, certification and seed production techniques in rice.

PRACTICAL

Male sterile lines in rice – morphological characterization: observations of sterility: inducing sterility – Supplementary pollination – Planting ratio – Planting methods – Recommended package of practices for hybrid rice seed production – Estimation of various types of heterosis in rice – Hybrid seed production in rice – an account on the released rice hybrids; their potential; problems and ways of overcoming it:

Practical Schedule

- 1) Origin and History – Botanical Description.
- 2) Genetic Classification.
- 3) Varietal Identification – Methods.
- 4) Types of rice cultivation.
- 5) Techniques of Hybrid development in rice.
- 6) Male sterile line and its application in rice.
- 7) Morphological characterization of male sterile lines.
- 8) Methods of observation for sterility.
- 9) Methods of inducing sterility.
- 10) Role of supplementary pollination in rice.
- 11) Planting ratio for rice hybrids.
- 12) Climatic and soil recommendation for hybrid rice.
- 13) Nursery and main field preparation.
- 14) Growing season and sowing methods – Transplanting.
- 15) Synchronization of flowering in hybrid rice.
- 16) Manures and fertilizers management.
- 17) Mid Semester Examination.
- 18) Plant Protection measures.
- 19) Seed harvesting and Processing techniques in rice.
- 20) Roll of seed certification in Hybrid rice production.
- 21) Sampling and testing procedures in hybrid rice.
- 22) Viability test in hybrid rice.
- 23) Vigour test in hybrid rice.
- 24) DUS test in hybrid rice.
- 25) Grow test in rice hybrid.
- 26) Multiplication ratio and seed replacement rate in hybrid rice.
- 27) Estimation of heterosis in rice.
- 28) Potential of released hybrids over existing lines.

- 29) Problem in Hybrid rice production.
- 30) Ways of overcoming problems in hybrid seed production.
- 31) Varietal release and notification.
- 32) Varieties released by state variety releasing committee.
- 33) Varieties released by central variety releasing committee.
- 34) Orientation for final practical examination.

5. CAG HOR 217 : NURSERY TECHNOLOGY (0+2)

Objectives

To impart knowledge on different methods of plant propagation and strategies for nursery management in fruit and ornamental crops.

PRACTICAL

Selection of nursery area – layout of nursery components – tools and implements – containers – media – preparation of seeds and seed treatment – potting materials and preparation of pot mixture – sowing and raising of root stocks (fruit and flower crops) – application of liquid manures and plant protection of nursery plants – potting of root stock and hardening – selection of scion plants and grafting – aftercare of grafted plants – graft separation and hardening – preparation of cuttings of ornamental and fruit plants – mist propagation techniques – treating the cuttings with growth regulators and planting in mist chamber in beds/polybags – potting of rooted cuttings and hardening – air layering of ornamental/fruit crops – budding of ornamental plants – potting and repotting – maintenance of potted plants – maintenance of records in nursery – packing and marketing – cost analysis – visit to private nurseries.

Practical Schedule

- 1) Selection of nursery area and layout of nursery components.
- 2) Identification of various tools and implements.
- 3) Media for propagation of nursery plants.
- 4) Study of various containers for nursery plants.
- 5) Preparation of seeds and seed treatment.
- 6) Sowing and raising of root stocks of fruit crops.
- 7) Raising of root stocks of flower crops.
- 8) Application of liquid manures for nursery plants.
- 9) Plant protection measures for nursery plants.
- 10) Potting materials and preparation of pot mixture.
- 11) Potting of root stocks and hardening.
- 12) Selection of scion plants and grafting.
- 13) Aftercare of grafted plants.
- 14) Graft separation and hardening.
- 15) Preparation of cuttings of ornamental plants.
- 16) Preparation of cuttings of fruit plants.

- 17) Mid Semester Examination.
- 18) Mist propagation techniques.
- 19) Treating the cuttings with growth regulators and planting in mist chamber in beds/polybags.
- 20) Potting of rooted cuttings and hardening.
- 21) & 22) Air layering of ornamental crops.
- 23) & 24) Air layering of fruit crops.
- 25) Budding of ornamental plants.
- 26) Hardening of budded plants.
- 27) Practices in potting and repotting.
- 28) Maintenance of potted plants.
- 29) Packing of nursery plants.
- 30) Marketing of nursery plants.
- 31) Maintenance of records in nursery.
- 32) Cost analysis.
- 33) Visit to private nurseries.
- 34) Orientation for final practical examination.

Reference Books

- 1) Bose, T.K., S.K. Mitra, M.K. Sadhu and B. Mitra. 1991. Propagation of Tropical and subtropical Horticultural Crops. Naya Prakash Publications, 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) Reddy, Y.T.N., T. Janakiram and D. Satyanarayana Reddy. 2001. Scientific Nursery Management. The House of Sarpan (Media), Bangalore.

FOURTH SEMESTER

AGR 221 : DRY FARMING AND AGROFORESTRY (2+1)

Unit-I : Principles of Dryfarming

Dryfarming – definition – classification. Major crops of Dryfarming in India and Tamil Nadu. History, Significance, Characteristics and constraints of dryfarming. Rainfall climatology – Length of growing period. Drought – Definition – types and effects of drought on crop production.

Unit-II : Drought Management

Drought management – Mechanism of drought tolerance in plants – Contingent crop planning and Mid season corrections. Soil moisture conservation approaches. Integrated dryfarming technologies and Mechanization. Watershed management – definition – concepts – scope and importance. *In – situ* water harvesting, storage and recycling. Water harvesting – farm pond, percolation pond.

Unit-III : Agroforestry and Social Forestry

Forest – Role of forests – Status of forests – Global forests scenario – Indian forests – National forest policies. Agro forestry – concept – definition – benefits –

components – Social forestry – concepts – definition – Afforestation – definition – Agroforestry – classification – Tree species suitable for agro forestry.

Unit-IV : Silviculture Practices

Silviculture practices for important agroforestry species viz., Teak, Casuarina, Eucalyptus, Subabul, Tamarind, Ailanthus, Pungam, Neem, Acacia spp and Bamboos.

Unit-V : Wasteland Management

Wastelands – definition – classification – suitable tree species – planting techniques for wastelands – Agroforestry systems for different types of problem soils and wastelands.

PRACTICAL

Zonation of Dry farming regions of Tamil Nadu, India and World – Characteristics of Agro Climatic Zone's of Tamil Nadu and cropping pattern – Rainfall analysis and crop planning – Study of tools, implements and machineries for drylands. Seed treatment technologies for dryfarming. Preparation of contingency crop plan to mitigate aberrant rainfall situations – Visit to watershed. Identification of trees, seeds and seedlings of important Agroforestry species – Forest nursery – types – layout – nursery technology for important tree species – visit to different agroforestry systems – visit to social forestry plantations – economics – assessing fodder and fuel requirements of a village.

Lectuer Theory Schedule

- 1) Dry farming and rainfed farming: Definition – concept.
- 2) Characteristics of dry farming and rainfed farming.
- 3) Major crops of dryland in India and Tamil Nadu.
- 4) Significance and scope of dry farming in India.
- 5) History of dryland agriculture.
- 6) Major constraints for crop production in dry land.
- 7) Rainfall climatology – length of growing period.
- 8) Drought: definition and types – Effects of drought on crop production.
- 9) Drought management strategies and contingent crop planning.
- 10) Mid season correction – mulching – thinning.
- 11) Anti transpirants and anti evaporants – definition, types and role.
- 12) *In – situ* soil moisture conservation techniques – Mechanical measures.
- 13) *In – situ* soil moisture conservation approaches – Biological measures.
- 14) Watershed: definition, principles of watershed management.
- 15) classification of watershed.
- 16) Scope and importance of watershed.
- 17) Water harvesting, storage and recycling.
- 18) Mid Semester Examination.
- 19) Forest – definition – Global and Indian forest status – National forest policy.
- 20) Role of forest.
- 21) Agroforestry – components – benefits.

- 22) Classification of agroforestry systems.
- 23) Primary systems – Agrisilviculture – silvipasture – agri silvipasture.
- 24) Social forestry and Agro forestry – definition – concepts.
- 25) Agroforestry Vs. social forestry.
- 26) Afforestation – definition – methods.
- 27) Agroforestry – Classification.
- 28) Tree species suitable for agro forestry in soil and water conservation.
- 29) Silviculture practices for Teak, Casuarina – Eucalyptus, Tamarind.
- 30) Silviculture practices for Tamarind, Neem, Acacia.
- 31) Silviculture practices for – pungam – Ailanthus – Bamboo.
- 32) Waste land – Definition – Classification – suitable tree species.
- 33) Agroforestry systems for different problem soils and waste lands.
- 34) Planting techniques and afforestation for wastelands.

Practical schedule

- 1) Agroclimatic, Agro ecological zones and characteristics. Zonation of dry farming regions of Tamil Nadu and India.
- 2) Characteristics of ACZs of Tamil Nadu and cropping pattern. Cropping and farming systems in dryland.
- 3) Rain fall analysis and crop planning.
- 4) Soil erosion and soil conservation practices. Water harvesting structure and their use.
- 5) Study of tools, implements, and machineries for drylands.
- 6) Drought management technologies to mitigate drought in dryfarming agriculture.
- 7) Preparation of contingency crop plan for aberrant rainfall situations.
- 8) Visit to watershed area to study the impact of various soil and moisture conservation methods.
- 9) Identification and description of seeds and seedlings of Teak, Casuarina, Eucalyptus, Tamarind, Ailanthus, Pungam, Neem, Acacia and bamboo.
- 10) Seed treatment techniques for agroforestry tree seeds.
- 11) Identification and description of fuel, fodder and green manure trees in the locality.
- 12) Nursery techniques for eucalyptus – casuarinas – production of stump for Teak.
- 13) Seedling Production and planting techniques for various tree species.
- 14) Visit to woodlots of casuarinas, eucalyptus, Neem, Tamarind, Teak – observing spacing, height, girth and calculating tree volume using the formula.
- 15) Working out economics of cultivation of tree species like Teak, Casuarina, and Eucalyptus.
- 16) Visit to nearby village and assessing the needs of fodder, fuel and green manure.
- 17) Orientation for final practical examination.

Reference Books

- 1) Rengasamy, P. 1990. Dry farming Technology in India. Agri publishing Academy, New Delhi.
- 2) Singh, R.P. 1996 Sustainable development of dryland Agriculture in India. Scientific Publishers, New Delhi.
- 3) Govindan, K. and V. Thirumurugan. 2003. Principles and practice of Dryland Agriculture, Kalyani Publishers, Chennai.
- 4) Thanunathan. K. and V. Imayavaramban. 2011, Agroforestry and Agronomy of Multipurpose Trees. SCITECH Publication (India) Pvt. Ltd. Chennai – 56 E.mail: scitech@airtelmail.in.

AGR 222 : CROP PRODUCTION – II (0+2)

PRACTICAL

This course is designed to impart practical aspects of scientific cultivation of any upland crop (maize / sorghum / pearl millet / finger millet / cotton / sunflower / sesame) to the students and acquire knowledge on the aspects of cultivation and make them competent to suggest appropriate technology to the farmers based on the varying soil and climatic conditions. Each student will be allotted a minimum land area and he / she will do all field operations in the allotted land from field preparation to harvest and processing.

Practical Schedule

- 1) Introduction – land allotment.
- 2) Preparation of calendar of operation.
- 3) Lay out and field preparation.
- 4) Application of organic manures and its importance.
- 5) Seed treatment.
- 6) Nursery preparation and techniques.
- 7) Calculation of seed rate.
- 8) Methods of seed treatment and its importance.
- 9) Calculation and application of herbicides for weed management.
- 10) Transplanting.
- 11) Assessment of plant population.
- 12) After cultivation practices.
- 13) Methods of weed management.
- 14) Irrigation management – critical stages for irrigation.
- 15) Recording plant bio-metric observation. Viz., plant height, no. of tillers, etc.
- 16) Working out LAI.
- 17) Mid Semester Examination.
- 18) Working out fertilizer requirement.
- 19) Top dressing of fertilizer.
- 20) Disease management.
- 21) Observation of nutrient deficiency symptoms and their management.
- 22) Study of growth phases.

- 23) Assessment of yield parameters.
- 24) Calculation of theoretical yield.
- 25) Assessment of maturity.
- 26) Physiological maturity and senescence.
- 27) Plot wise yield estimation – actual yield.
- 28) Harvesting.
- 29) Threshing.
- 30) Cleaning and winnowing.
- 31) Cost of agricultural inputs.
- 32) Working out cost of cultivation.
- 33) Value addition.
- 34) Orientation for final practical examination.

Reference books

- 1) Chidda Singh.1997. Modern techniques of raising field crops. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
- 2) ICAR 2006. Hand book of Agriculture. Indian Council of Agriculture, New Delhi.
- 3) Crop Production Guide. 2005. Directorate of Agriculture, Chennai and Tamil Nadu Agricultural University, Coimbatore.

GPB 223 : SEED PRODUCTION TECHNIQUES (1+1)

Objectives

To impart knowledge about floral biology, quality seed production, seed processing, seed treatment and seed certification in field crops.

Unit-I : Seed Quality Concept

Seed – Importance of quality seed – Characteristics of Seed Quality – Generation system of seed multiplication – Classes of Seed – Nucleus, Breeder, Foundation and Certified Seed – Guidelines for Seed Production – Multiplication Ratio.

Unit-II : Seed Development & Maturation

Floral biology – Pollination and fertilization – Role of Insects, Environmental and Edaphic Factors – Seed Production Techniques for Varieties and Hybrid in Rice, Sorghum, Maize, Cumbu – Redgram and Blackgram.

Unit-III : Seed Production

Seed production techniques varieties and hybrids in Cotton – Groundnut and Sunflower and Important Vegetables: like Tomato, Brinjal, Chillies, Bhendi, Lablab and Cucurbits.

Unit-IV : Seed Processing and Storage

Harvesting – Processing – Seed Treatment, types, importance – Storage, factors affecting seed storage, Godown sanitation – Packaging material – Types – Seed Health and Marketing.

Unit-V : Seed Certification & Qualification

Seed Certification, general certification standards – Phases of seed certification, Field Inspection – Methodology for Certification – Seed Standards.

THEORY

Seed – Importance – Seed Quality Characteristics – Classes of Seed – Nucleus, Breeder, Foundation and Certified Seed – Guidelines for Seed Production – Multiplication Ratio – Floral biology – Pollination and fertilization – Role of Insects, Environmental and Edaphic Factors – Seed Production Techniques for Varieties and Hybrid in Rice, Sorghum, Maize, Cumbu, Pulses – Redgram, Blackgram, Cotton, Oilseeds – Groundnut and Sunflower and Important Vegetables: Tomato, Brinjal, Chillies, Bhendi, Lablab and Cucurbits – Harvesting – Processing – Seed Treatment – Storage – Seed Health and Marketing – Seed Certification, general certification standards – Field Inspection – Methodology for Certification – Seed Standards.

PRACTICAL

Identification of Crop and Weed Seeds – Synchronization Techniques – Determining Physiological Maturity Status – Seed Extraction Methods – Field count – Sampling of Seed – Purity analysis – Germination test – TZ Test – viability and vigour – Grow out Test – Seed Health Test – Visit to Seed Testing Laboratory and Seed Certification Office. Various Seed Processing techniques – Seed Treatment – Storage and Packing – Seed Blending – Cost / Benefit Ratio for Seed Crops.

Theory Lecture Schedule

- 1) Seed – Importance – Seed Quality Characteristics.
- 2) Classes of Seed – Nucleus, Breeder, Foundation and Certified Seed.
- 3) Guidelines for Seed Production – Multiplication Ratio.
- 4) Floral biology – Pollination and fertilization – Role of Insects, Environmental and Edaphic Factors.
- 5) Seed Production Techniques for Varieties and Hybrids in Rice.
- 6) Seed Production Techniques for Varieties and Hybrids in Maize.
- 7) Seed Production Techniques for Varieties and Hybrids in Sorghum and Cumbu.
- 8) Seed Production Techniques for Varieties and Hybrids in Pulses – Redgram and Blackgram.
- 9) Mid Semester Examination.
- 10) Seed Production Techniques for Varieties and Hybrids in Cotton – groundnut and sunflower.
- 11) Seed Production Techniques for Varieties and Hybrid in Tomato, Brinjal, Chillies.
- 12) Seed Production Techniques for Varieties and Hybrid in Bhendi, Lablab and Cucurbits.
- 13) Harvesting, Processing & Seed Treatment.
- 14) Storage, Seed Health and Marketing.
- 15) Seed Certification, General certification standards.
- 16) Seed certification procedure.
- 17) Field Inspection for Certification and Seed Standards.

Practical Schedule

- 1) Identification of Crop and Weed Seeds.
- 2) Synchronization Techniques.
- 3) Field count.

- 4) Determining Physiological Maturity Status.
- 5) Seed Extraction Methods.
- 6) Visit to Seed Testing Laboratory and Seed Certification Office.
- 7) Sampling of Seed – Purity analysis.
- 8) Germination Test.
- 9) TZ Test – viability and vigour.
- 10) Grow – out Test.
- 11) Seed Health Test.
- 12) Various Seed Processing techniques.
- 13) Seed Treatment – Storage and Packing.
- 14) Seed Blending.
- 15) Cost / Benefit Ratio for Seed Crops.
- 16) Orientation for final practical examination.

Reference Books

- 1) Oren L. Justice and Louis N. Bass (1979). Principles and Practices of Seed storage. Scientific Publishers (india).
- 2) Bidhan Roy, Asit kumar Basu & Asit B. Mandal 2013. Breeding, Biotechnology and Seed production of field crops. New India Publishing Agency, India.
- 3) Agrawal, R.L. 1996. Seed Technology, Oxford & IBH Publishing Co., New Delhi.
- 4) Bhaskaran, M. *et al.*, 2004. Principles of seed production. Scientific Publishers, Ludhiana.

HOR 224 : VEGETABLE AND FRUIT CULTURE (2+1)

Objectives

To impart knowledge on the scenario of advanced production techniques and production constraints in vegetable and fruit crops.

THEORY

Unit-I : Importance of Vegetable Crops

Importance of vegetables – nutritive value – classification of vegetables – cropping systems in vegetable crops – types of vegetable garden: kitchen garden, truck garden, market garden, roof garden.

Unit-II : Production Technology of Vegetable Crops – I

Soil and climatic requirements, varieties, cultural practices, manuring, irrigation, weeding – use of growth regulators, harvesting, yield and post harvest handling of the following crops: tomato, brinjal, chillies, bhendi, onion, garlic and cucurbits.

Unit-III : Production Technology of Vegetable Crops – II

Cauliflower, cabbage, salad vegetables, root and tuber vegetables, amaranthus and moringa.

Unit-IV : Production Technology of Fruit Crops – I

Scope and importance of tropical, subtropical and temperate fruits – overview – area and production of fruit crops in Tamil Nadu – climatic zones of Tamil Nadu – soil, climate, varieties, cultural, manurial, horticultural and irrigation practices –

physiological and nutritional disorders – training and pruning – role of growth regulators – maturity standards – methods of harvesting – yield and post harvest technology – grading – packing – storage of the following fruit crops:

Mango, banana, grapes, papaya, sapota, guava, citrus and pomegranate

Unit-V : Production Technology of Fruit Crops – II

Ber, annona, amla, jack, apple, pear, peach, plum and pineapple

PRACTICAL

Preparation of nursery bed – protray nursery seedling production – preparation of main field and forming beds, ridges and furrows – methods of fertilizer application – irrigation systems: drip and sprinkler irrigation – herbicide application – growth regulator application – layout of pandal and training of gourds – maturity indices and harvesting of vegetables.

Layout of orchard – methods of planting – sucker treatment in banana – methods of irrigation – methods of fertilizer application – training and pruning of different fruit crops – harvesting of fruits.

Theory Lecture Schedule

- 1) Importance of vegetables and its nutritive values.
- 2) Classification of vegetables.
- 3) Cropping systems in vegetable crops.
- 4) Types of vegetable gardens: kitchen, truck, market and roof gardens.
- 5) Cultivation practices of tomato.
- 6) Cultivation practices of brinjal.
- 7) Cultivation practices of chillies.
- 8) Cultivation practices of bhendi.
- 9) Cultivation practices of onion and garlic.
- 10) Cultivation practices of cucurbits.
- 11) Cultivation practices of cauliflower and cabbage.
- 12) Cultivation practices of potato and sweet potato.
- 13) Cultivation practices of tapioca and yams.
- 14) Cultivation practices of salad vegetables.
- 15) Cultivation practices of amaranthus.
- 16) Cultivation practices of moringa.
- 17) Mid Semester Examination.
- 18) Area and production of fruit crops in Tamil Nadu.
- 19) Importance of fruit production and nutritive value of major fruits.
- 20) & 21) Cultural practices of mango.
- 22) & 22) Cultural practices of banana.
- 23) Cultural practices of grapes.
- 24) Cultural practices of papaya.
- 25) Cultural practices of sapota.
- 26) Cultural practices of guava.
- 27) & 28) Cultural practices of acid lime, mandarin orange and sweet orange.
- 29) Cultural practices of pomegranate.

- 30) Cultural practices of ber and annona.
- 31) Cultural practices of amla and jack.
- 32) Cultural practices of apple and pear.
- 33) Cultural practices of plum and peach.
- 34) Cultural practices of pineapple.

Practical Schedule

- 1) Preparation of raised nursery bed, manure application and working out seed requirement.
- 2) Protray seedling production and preparation of main field for vegetables (bed, ridges and furrows).
- 3) Practicing seed and seedling treatment for various vegetable crops.
- 4) Methods of manuring for transplanted and direct sown vegetable crops.
- 5) Drip and sprinkler irrigation lay out for vegetable crops.
- 6) Practicing herbicide and growth regulators application for direct sown and transplanted vegetable crops.
- 7) Practicing top dressing application.
- 8) Pandal lay out and training of gourds.
- 9) Layout of orchard for different fruit crops.
- 10) Practicing of planting: mango, sapota and guava.
- 11) Practicing banana sucker preparation and sucker treatment for planting.
- 12) Working out fertilizer requirement for important fruit crops.
- 13) Study of varieties of mango, banana, papaya, guava and sapota.
- 14) Study of varieties of grapes, pomegranate, ber, annona, amla and jack.
- 15) Fertigation systems: study of components and scheduling.
- 16) Training and pruning of different fruit crops.
- 17) Orientation for final practical examination.

Reference Books

- 1) Bose, T.K., S.K.Mitra and D. Samyal. 2001. Fruits – Tropical and Subtropical. Vol. I., Naya Udyog, Calcutta.
- 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) Chattopadhyay, T.K. 1994. A Text Book of Pomology (Vol. 1–3). Kalyani Publishers, New Delhi.
- 4) Gopalakrishnan, T.R., 2007. Vegetable Crops. New India Publishing Agency, New Delhi.
- 5) Pranab Hazra, A. Chattopadhyay, K. Karmakar and S. Dutta. 2010. Modern Technology in Vegetable Production. New India Publishing Agency, New Delhi.
- 6) Singh, S.P. 1995. Commercial Fruits. Kalyani Publishers, Ludhiana.
- 7) Veeraraghavathatham, D., M. Jawaharlal. S. Jeeva, R. Rabindran and G. Umapathy. 2004. Scientific Fruit Culture. Soori Associates, Coimbatore.
- 8) Veeraraghavathatham. D., M Jawaharlal and Seemanthini Ramdas. 1991. A guide on vegetable culture. A. E. Publications, Coimbatore.
- 9) Vishnu Swarup, 2006. Vegetable Science and Technology in India. Kalyani Publishers, New Delhi.

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

Objectives

To impart knowledge about rural settings, techniques of technology transfer and modern methods of communication.

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 and result demonstration. Group contact methods – Method demonstration, group meetings, brain storming, role play and organizing small group training. Mass contact methods – campaigns, exhibition, farmers day, field trip, TV and 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 kiosk, 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.

Theory Lecture Schedule

- 1) Sociology – Rural sociology – Characteristics of rural society.
- 2) Rural – Urban differences.
- 3) Leaders – 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) Mid-Semester Examination.

- 9) Individual contact methods – farm and home visit, office calls, telephone calls and result demonstration.
- 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 and 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) Mid-Semester Examination.
- 10) Conducting group discussion and Farmers Discussion Group (FDG) meeting.
- 11) Conducting method demonstration.
- 12) Organizing campaign, exhibition, field days and melas.
- 13) Visit to villages to study the adoption pattern of new technologies.
- 14) Visit to office of Joint Director of Agriculture / ADA / ADH / to know the activities.
- 15) Visit to All India Radio to study the functions.
- 16) Visit to news paper printing press to know its activities.
- 17) Orientation for final practical examination.

Reference books

- 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.

AEX 226 : STUDY TOUR (0+1)**PRACTICAL**

The students will visit various National and International level institutions related to Agriculture and other allied fields, agro – based industries, commercial farms and research stations in various agro – climatic regions of the country. The students will gain first hand knowledge about different agro-climatic zones, crops grown and cultivation practices. The duration of the tour will be for 10 days inclusive of days of start and return. Students will maintain a tour diary to record their observations at the places of visit. A tour record has to be submitted after the tour.

CAG 227 : COMMERCIAL AGRICULTURE – II

Sl.No.	Subject Code	Subject Name	Credit
1.	CAG AGR 227	Micro irrigation – micro (pressurized) irrigation (drip/sprinkler)	0+2
2.	CAG AGM 227	Biofertilizer technology	0+2
3.	CAG SAC 227	Fortified organic compost preparation	0+2
4.	CAG HOR 227	Commercial floriculture and landscape gardening	0+2
5.	CAG AHS 227	Broiler, quail and turkey management	0+2

1. CAG AGR 227 : MICRO IRRIGATION (0+2)**MICRO (PRESSURIZED) IRRIGATION (DRIP / SPRINKLER)****PRACTICAL**

This course is designed to acquire skill in selection of suitable irrigation system, layout, system design criteria and installation of drip / sprinkler system. Irrigation scheduling and maintenance of pressurized irrigation system – maintenance of main and sub main pipe lines, laterals and emitters / nozzles – management of clogging and chlorination – super chlorination and acid treatment. Fertigation with water soluble fertilizers. Crop response, water use efficiency and economic evaluation knowledge gaining.

Practical Schedule

- 1) Concept of pressurized irrigation.
- 2) Types of pressurized irrigation.
- 3) Merits and demerits of pressurized irrigation.
- 4) Selection of suitable layout – system design criteria and layout.
- 5) Selection of suitable components – installation of drip / sprinkler system.
- 6) Irrigation scheduling.
- 7) Operations of the system.
- 8) Maintenance of pressurized irrigation system – maintenance of main and sub main pipe lines, laterals and emitters / nozzles.
- 9) Management of clogging and chlorination – super chlorination and acid treatment.
- 10) Fertigation – concept of fertigation.

- 11) Water soluble fertilizers for fertigation.
- 12) Water use efficiency.
- 13) Crop response and economic evaluation.
- 14) Periodical observation should be taken throughout the crop period.
- 15) System as a whole analysis – project preparation for a given resource situation with its economics.
- 16) Introduction to concept of sprinkler irrigation.
- 17) Mid Semester Examinations.
- 18) System of sprinkler irrigation.
- 19) Selection of suitable layout.
- 20) Layout of sprinkler irrigation system.
- 21) Selection of suitable components of sprinkler system.
- 22) Installation of sprinkler system.
- 23) Scheduling of sprinkler system.
- 24) Operations of sprinkler system.
- 25) Maintenance of main and sub main pipe lines.
- 26) Maintenance of sprinkler head.
- 27) Management of clogging and chlorination.
- 28) Super chlorination and acid treatment.
- 29) Recording growth parameters of crop.
- 30) Recording yield from crop.
- 31) Economic evaluation.
- 32) Water use efficiency and system as a whole analysis.
- 33) Project preparation for a given resource situation with its economics.
- 34) Orientation for final practical examination.

2. CAG AGM 227 – BIOFERTILIZER TECHNOLOGY (0+2)

PRACTICAL

To study in detail about the role of microbial inoculants in sustainable Agriculture and the isolation of bacterial fungal algal inoculants – their mass production and quality control.

Practical Schedule

- 1) Isolation of *Rhizobium*.
- 2) Characterization and identification of *Rhizobium*.
- 3) Isolation of *Azospirillum*.
- 4) Characterization and identification of *Azospirillum*.
- 5) Testing the efficiency of nitrogen fixation.
- 6) Isolation of *Azotobacter*.
- 7) Characterization and identification of *Azotobacter*.
- 8) Isolation of *Acetobacter*.
- 9) Isolation of *Phosphobacteria*.

- 10) Testing the efficiency of Phosphate solubilisation.
- 11) Isolation of blue green algae.
- 12) Isolation of Mycorrhiza.
- 13) Determination of % colonization of mycorrhiza.
- 14) Isolation and enumeration of mycorrhizal spores.
- 15) Screening methods of mycorrhizal inoculants.
- 16) Isolation of silicate solubilizing bacteria.
- 17) Mid Semester Examination
- 18) Isolation of zinc solubilizing bacteria.
- 19) Isolation of Pink Pigmented methylotrophs.
- 20) Mass production of carrier based bacterial inoculants.
- 21) Mass production of liquid formulation of bacterial inoculants.
- 22) Testing quality standards of bacterial inoculants.
- 23) Method of application bacterial inoculants.
- 24) Mass production of mycorrhizal inoculants and quality control.
- 25) Mass production of blue green algae and quality control.
- 26) Mass Production of azolla.
- 27) Quality control of algal biofertilizer.
- 28) Method of application of algal biofertilizer.
- 29) ISI standards of various biofertilizer.
- 30) Working out cost / benefit ratio of biofertilizer.
- 31) Constraints of biofertilizer technology.
- 32) Maintenance of Mother cultures.
- 33) Visit to Biofertilizer production centre.
- 34) Orientation for Final Practical Examination.

Reference Books

- 1) Motsara, M.R Bhattachary, P and Srivastava .B 1995. Biofertilizer technology marketing and usage, Fertilizer development & consultant organisation, New Delhi.
- 2) Subba Rao, N.S 1994. Biofertilizer in Agriculture and Agroforestry. Oxford and IBH New delhi.
- 3) Subba Rao, N.S, 1995 soil microorganisms and plant growth oxford and IBH, New Delhi.

3. CAG SAC 227 : FORTIFIED ORGANIC COMPOST PREPARATION

PRACTICAL

Different methods of compost preparation – Farm residues, Crop residues, Dairy waste – quality analysis of compost – Determination of pH, EC, Total N, Total P, Total K, Total C, C:N ratio. Evaluation of compost maturity. Preparation of vermicompost, sugarcane trash compost and poultry manure compost. Preparation of nutrient fortified compost – nitrogen, phosphorus and micro – nutrients. Preparation of bio – fortified compost.

Practical Schedule

- 1) Collection of farm residues, crop residues and dairy waste.
- 2) Sampling of organic manures for analysis.
- 3) Preparation of farm yard manure (FYM) by trench method.
- 4) Preparation of farm yard manure (FYM) by heap method.
- 5) Preparation of enriched farm yard manure (EFYM).
- 6) Preparation of compost by Bangalore method.
- 7) Preparation of compost by Coimbatore method.
- 8) Preparation of rural compost.
- 9) Preparation of urban compost.
- 10) Preparation of phospho – compost.
- 11) Preparation of coirpith compost .
- 12) Collection of earth worms and feeding materials for vermicompost .
- 13) Preparation of vermicompost by pit method.
- 14) Preparation of vermicompost by trench method.
- 15) Collection of sugarcane trash from field.
- 16) Preparation of sugarcane trash compost.
- 17) Mid Semester Examination.
- 18) Collection of poultry waste from poultry farm.
- 19) Preparation of poultry manure compost .
- 20) Collection of NPK and micronutrient fertilizers.
- 21) Preparation of nitrogen fortified compost.
- 22) Preparation of phosphorus fortified compost and
- 23) Preparation of micronutrient fortified compost.
- 24) Preparation of nitrogen, phosphorus and micronutrient fortified compost.
- 25) Preparation of bio – fortified compost.
- 26) Evaluation of maturity of composts.
- 27) Quality standards of compost.
- 28) Estimation of pH and EC in composts.
- 29) Estimation of Total nitrogen in composts.
- 30) Estimation of Total Phosphorus in composts I.
- 31) Estimation of Total Phosphorus in composts II.
- 32) Estimation of Total Potassium in composts.
- 33) Estimation of Total C in composts.
- 34) Interpretation of analytical data of composts.

Reference Books

- 1) Arunkumar Sharma. 2008. A hand book of organic farming. Agrobios Publishers, Jodhpur.
- 2) Das, P.C. 1993. Manures and fertilizers, Kalyani Publishers, Ludhiana.
- 3) Gupta, P.K. 2003. A hand book of soil, fertilizers and manures, Agrobios(India), Jodhpur.
- 4) Yawalkar, K.S., J.P. Agarwal and S. Bokde. 1992. Manures and fertilizers, Agri.Horticultural Publishing House, Nagpur.

4. CAG HOR 227 : COMMERCIAL FLORICULTURE AND LANDSCAPE GARDENING (0+2)

PRACTICAL

Loose flowers – identification of commercial varieties – propagation and nursery practices – seed treatment and sowing – planting material preparation : cuttings, layers and bulbs – practices in field preparation, layout and planting of loose flowers – practices in manuring, weeding, irrigation – practices in special operations: training, pruning and pinching, harvesting and postharvest handling – grading, packaging and storage.

Cut flowers – Identification of commercial varieties – protected structures – practices in propagation – fumigation, growing media and bed preparation – practices in manuring, weeding, irrigation – practices in special operations : growth regulator application, netting, pinching, disbudding – harvesting and postharvest handling – grading, packaging and storage of cut flowers.

Visit to fields of commercial loose flower crops, green house cultivation units and concrete and dye / pigment extraction units – working out input requirements and cost benefit ratio for loose and cut flowers.

Features of ornamental garden, identification of ornamental plant species – identification of plant and non plant components – practices in establishment and maintenance of plant and non – plant components – identification of lawn grasses – practices in lawn making methods – operations in ornamental nursery – exposure visit to industrial, institutional, residential complex, public garden – project preparation.

Practical Schedule

- 1) Identification of commercial varieties – practices in propagation and nursery practices of the following crops: Rose.
- 2) Jasmine.
- 3) Tuberose and Chrysanthemum.
- 4) Marigold and Crossandra.
- 5) Celosia, Nerium and Gomphrena.
- 6) Practices in special operations: training, pruning and pinching.
- 7) Visit to commercial loose flower cultivation fields.
- 8) Identification of commercial varieties – practices in propagation – fumigation, media and bed preparation – after cultivation practices – special operations : growth regulator application, bending, pruning, netting, harvesting of the following crops: Cut Rose.
- 9) Carnation.
- 10) Gerbera.
- 11) Chrysanthemum.
- 12) Orchids.
- 13) Anthurium.
- 14) Liliium.
- 15) Gladiolus, Alstroemeria, Heliconia.
- 16) Practices in postharvest management of cut flowers (precooling, grading, pulsing, storage, packaging and marketing of cut flowers).

- 17) Mid Semester Examination.
- 18) Visit to green house cultivation units and concrete and dye/pigment extraction units.
- 19) Working out input requirements and cost benefit ratio for loose and cut flowers.
- 20) Study of different plant components in ornamental garden.
- 21) Identification of the following ornamental plant species – Trees.
- 22) Annuals.
- 23) Shrubs.
- 24) Climbers and creepers.
- 25) Ferns, cacti and succulents.
- 26) Palms and cycads.
- 27) Practices in establishment and maintenance of non – plant components.
- 28) Practices in establishment and maintenance of plant components.
- 29) Identification of lawn grasses.
- 30) Practices in lawn making methods.
- 31) Practices in nursery production of ornamental plants.
- 32) Exposure visit to industrial garden, institutional garden, residential complex and public garden.
- 33) Project preparation on different types of garden.
- 34) Orientation for final practical examination.

Reference Books

- 1) Bose, T.K. and Yadav, L.P. 1989. Commercial Flowers. Naya Prokash, Calcutta.
- 2) Bhattacharjee, S.K. and L.C.De. 2003. Advances in Commercial Floriculture (2 Vol). Aavishkar Publishers, Jaipur, India.
- 3) Kumar, N. 1998. Introduction to Horticulture (Revised sixth Edition) Rajalakshmi Publication, Nagercoil.
- 4) Nambisan, K.M.P. 1992. Design Elements of Landscape Gardening. Oxford and IBH Publications, New Delhi.
- 5) Pal, B.P. 1960. Beautiful Climbers of India. ICAR, New Delhi
- 6) Randhawa, G.S. 1973. Ornamental Horticulture in India. Today and Tomorrow's Printers and Publishers, Karol Bagh, New Delhi.
- 7) Randhawa, G.S and Mukhopadhyay, A. 1986. Floriculture in India. Allied Publishers Pvt. Ltd., New Delhi.

5. CAG AHS 227 : BROILER, QUAIL AND TURKEY MANAGEMENT (0+2)

Objectives

- To provide opportunity for the students to learn about all aspects of the broiler farming.
- To acquire hands on training for establishing a small scale commercial poultry enterprise that open avenues for self employment.

PRACTICAL

Introduction – Broiler Industry in India – Selection of farm site and broiler chicks – Systems of rearing and housing – cleaning and disinfection of broiler house and equipments – Broiler farm equipments – Preparation of brooder house –

Brooding – Litter management – Feeding management – Feed ingredients – Disease management and Vaccination schedule – Summer management – Technical standards – Farm records – Integration – Project report – Dressing of chicken – Value added chicken meat products – Quail farming – brooding and feeding of quails – Project report – Dressing of quail – Value added quail egg and meat products – Turkey farming – breeds – housing – feeding – Disease control and vaccination – Project report – Dressing of turkey – Value added turkey meat products – Visit to quail farm and feed mill.

Practical Schedule

- 1) Broiler Industry in India.
- 2) Selection of farm site.
- 3) Selection of broiler chicks.
- 4) Systems of broiler rearing.
- 5) Systems of housing for broiler.
- 6) Cleaning and disinfection of poultry house and equipments.
- 7) Identification of broiler farm equipments.
- 8) Preparation of brooder house to receive the chicks.
- 9) Brooding of chicks.
- 10) Litter management.
- 11) Feeding management
- 12) Identification of broiler feed ingredients.
- 13) Disease management and vaccination schedule of broilers.
- 14) Summer management of broiler.
- 15) Technical standards in broiler production.
- 16) Measures of efficiency in broiler production.
- 17) Broiler farm integration.
- 18) Maintenance of farm records.
- 19) Preparation of broiler project reports.
- 20) Demonstration of dressing of chicken.
- 21) Preparation of value added chicken meat products.
- 22) Quail farming – brooding and feeding management.
- 23) Preparation of quail farm project.
- 24) Demonstration of dressing of quails.
- 25) Preparation of value added quail egg and meat products.
- 26) Turkey farming – selection of turkey breeds and housing management.
- 27) Feeding management of turkey.
- 28) Disease control and vaccination schedule of turkeys.
- 29) Demonstration of dressing of turkey.
- 30) Project report for turkeys.
- 31) Value added turkey meat products.
- 32) Visit to quail farm.
- 33) Visit to feed mill.
- 34) Orientation for final practical examination.

Reference Books

- 1) Broiler Production: Economics and marketing 2016. Sudhakar Dwivedi, Mourp
- 2) Dolma & Pawan Kumar Sharma. New Delhi publishers.
- 3) Handbook of Poultry, 2011. Manoj Kumar Rai, Oxford Book Company.
- 4) Poultry Husbandry 2008. Morley A Jull, JV Publishers.
- 5) Poultry Management, 2010. Rajeshwar prasad, Alfa publishers.
- 6) Poultry Production in India, 2008. R.P.Sharma , R.N.Chatterjee, S.V.Ramarao, & S.R.Sharma, ICAR Publications, New Delhi.

TAM 228 : jkpo; top jfty; ghpkhw;w topKiwfs; (0+1)

bra;Kiw

fiyr; brhw;fs; – ntshz;ik/ tl;lhu tHf;F. fl;Liu vGJjy; – bra;jpf; fl;Liu/ bghJf; fl;Liu/ fojk; vGJjy; – mYtyff; fojk;/ cHth;fSf;F fojk;/ bra;jp jahhpj;jy;/ gj;jphpf;if MrpaUf;F fojk; vGJjy;. thbdhypf;F bra;jp jahhpj;jy; – tl;lhu tHf;fpw;nfw;g bkhHp eil ifahSjy;. mr;Rg;gpiH jpUj;jk; kw;Wk; gpiHapd;wp vGJjy;. nkilg; ngr;R. ftpau';fk; – ntshz;ikf; ftpij/ g[J bkhHp; – fz;fhl;rp/ fUj;Jf; fhl;rp/ gl;okd;wk; – ciufs;/ ciuahly;/ fye;Jiuahly;/ neh;fhzy;. ntshz;ik ehlfk; – bray; tpsf;ff; Tl;l';fs; – ghuk;ghpa bjhHpy; El;g';fis fz;lwpe;J bghUs; fhzy;/ jd; Fwpg;g[jahhpj;jy;/ ntiyf;F tpz;zg;gpj;jy;/ neh;Kfj; njh;t[k; mij vjph;bfhs;Sk; KiwfSk;.

bra;Kiw ml;ltiz

1. fiyr; brhw;fs; – ntshz;ikf; fiyr; brhw;fs;/ tl;lhu tHf;Fr; brhw;fs;
2. fl;Liu vGJjy; – fl;Liu tiffs;/ ntshz; bra;jpf; fl;Liu vGJjy;/ bghJf; fl;Liu vGJjy;
3. fojk; vGJjy; – mYtyff; fojk; vGJjy;/ cHth;fSf;F fojk; vGJjy;
4. bra;jp; jhSf;Fr; bra;jp jahhpj;jy;/ gj;jphpf;if MrpaUf;F fojk; vGJjy;
5. thbdhypf;F bra;jp jahhpj;jy; – tl;lhu tHf;fpw;nfw;g bkhHp eil ifahSjy;
6. mr;Rg;gpiH jpUj;jk; kw;Wk; gpiHapd;wp vGJjy; gapw;rp
7. nkilg; ngr;R – tuyhW/ tiffs;/ eilfs;/ gz;g[fs;
8. ,ilg; gUtj; njh;t[
9. ftpau';fk; – ntshz;ikf; ftpij
10. g[J bkhHpf; jahhpj;jy; – fz;fhl;rp/ fUj;Jf;fhl;rp
11. gl;okd;wk; – ntshz; jiyg;gpy; gl;okd;wk;
12. nkilg; ngr;R – ciufs; – jiyika[iu/ thH;j;Jiu/ ed;wpa[iu epfH;j;Jjy;
13. ciuahly; – fye;Jiuahly;/ neh;fhzy;
14. ntshz;ik ehlfk; kw;Wk; bray; tpsf;ff; Tl;l';fs; elj;Jjy;
15. ghuk;ghpa bjhHpy; El;g';fis fz;lwpe;J bghUs; fhzy;
16. jd; Fwpg;g[jahhpj;jy;/ ntiyf;F tpz;zg;gpj;jy;/ neh;Kfj; njh;t[k; mij vjph;bfhs;Sk; KiwfSk;
17. bra;Kiw njh;t[

