Swami Ramanand Teerth Marathwada University, Nanded

Choice Based Credit System (CBCS) Course Structure
Faculty of Science

B. Sc. Second Year Syllabus

Semester Pattern effective from June 2017

Subject: Agrochemicals and Fertilizers

Semester	Course No.	Name of the Course	Instruction Hrs / week	Total period	CA	ESE	Total Marks	Credits
III	CCAGF III (Section A)	Plant Nutrition and Fertilizers)	03	45	10	40	50	2
	CCAGF III (Section B)	Insecticides and Herbicides	03	45	10	40	50	2
	CCAGFP II [CCAGFIII & IV (Section A)]	Practical's based on P-VI & P-VIII (P-X)	03 03	Practicals 08 08	05 05	20 20	25 25	1 1
	SECAGF I	SEC I	02	02	25	25	50	(02)*
IV	CCAGF IV (Section A)	Manures and Organic farming	03	45	10	40	50	2
	CCAGF IV(Section B)	Plant Diseases and fungicides)	03	45	10	40	50	2
	CCAGFP III [CCAGF III & IV (Section B)]	Practical's based on P-VII & P-IX (P-XI)	03 03	Practicals 08 08	05 05	20 20	25 25	1 1
	SECAGF II	SEC II	02	02	25	25	50	(02)*
Total credits semester III and IV								**12(04)***

~Note: ESE of CCAGFPII, CCAGFPIII & SECAGF I, SECAGF II should be evaluated at annual

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Agrochemicals and Fertilizers

CCAGF III (Section A)

PLANT NUTRITION AND FERTILIZERS (P-VI)

Credits: 02 (Marks: 50) Periods: 45

UNIT- I

1. Plant Nutrition: **08**

Essential plant Nutrients
Functions and deficiency Symptoms of the essential Nutrients. Forms in which Nutrients are utilized by crop plants.
How plants absorb nutrients
Sources of plant Nutrients

2. Nitrogenous Fertilizers: **08**

Introduction
Classification
General Characteristics.
Manufacturing process and Properties of Ammonium Sulphate, Urea & Ammonium nitrate

UNIT-II

3. Phosphatic Fertilizers: **08**

Introduction
Classification
Manufacturing Process and Properties of Super Phosphate.
Rock Phosphates.

4. Potassic Fertilizers. **06**

Introduction.
Classification.
Manufacturing process and properties of muriate of potash and Sulphate of potash. Potash Minerals.

UNIT-III

5. Complex Fertilizers **06**

Introduction.
Advantages
Manufacturing process and properties of Nitro phosphate
Ammonium phosphate.

UNIT-IV

6. Mixed Fertilizers. **06**

Introduction.
Advantages and Disadvantages.

Materials used in mixed Fertilizers.
Method of Preparation.
Granulated Fertilizer mixtures

7. Micro Nutrient Carriers. **03**

Introduction.
Micro Nutrient Fertilizers.
Soil Conditions Conducive to Micro Nutrient deficiency. Methods of Application

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Agrochemicals and Fertilizers

CCAGF III (Section B)

Insecticides and Herbicides

Credits: 02 (Marks: 50) Periods: 45

UNIT-I

1. Insecticides: **12**

Introduction and Definition.
Losses Caused by insects
Classification of Insecticides
Insecticidal formulations.
Natural Insecticides: Pyrethroids and Neem based Principals and Methods of Insect Control
Physical and mechanical control.
Cultural Control.
Biological Control.
Chemical Control.
Legal or legislative Control.

UNIT-II

2. Synthetic insecticides and Integrated pest management: **12**

Organo chlorine Insecticides.
Organo Phosphorus Insecticides.
Carbamates & Sulphur Containing Compounds. Synthetic Pyrethroids.
Fumigants.
Control of stored grain pests.
Integrated Pest Management.

UNIT -III

3. Weeds and their Control: **09**

Introduction:- Definition and Characteristics of weeds. Damage Caused by weeds.
Classification of weeds.
Weed Control methods.
Mechanical.
Cultural.
Chemical.
Biological.

UNIT-IV

4. Herbicides: **12**

Definition and Classification.
Some important Herbicides: 2,4-D, 2,4-5-T, simazine, atrazine, TCA, monuron
Dalapon, Glyphoset, (Structure, Chemical Names, Common Names and uses of above herbicides are expected)
Precautions in Storage and handling of herbicides.

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Agrochemicals and Fertilizers

CCAGF IV (Section A)

MANURES AND ORGANIC FARMING (P-VIII)

Credits: 02 (Marks: 50) Periods: 45

UNIT –I

1. Bulky organic Manures: **08**

Farm yard Manures: Introduction, composition, losses during handling and storage and improved methods of preparation.
Compost: - Definition, composition, classification, methods of preparation.
Green Manuring:- Introduction, advantages and disadvantages, Green Manuring in situ, Green Leaf Manuring.

2. Concentrated organic Manures: **04**

Oilcakes
Blood meal
Meat Meal
Fish Manure
Bone meal

UNIT-II

3. Time and Methods of Fertilizer applications: **05**

Principles governing selection of proper time and correct method of application, Different Methods of Fertilizer applications.
Fertigation
Liquid Fertilizers.

4. Balanced and Profitable use of Fertilizers: **05**

Principles of balanced Fertilization.
Profitable use of Fertilizers.
Factors affecting optimum use.
Economics of Fertilizer Use.

UNIT-III

5. Biofertilizers: **10**

Introduction
Classification
Importance in Agriculture.
Study of Rhizobium, Azotobacter, BGA and Azolla biofertilizers.

UNIT-IV

6. Concepts of organic farming and sustainable agriculture: **06**

Definition, need, principals and steps to successful organic farming

7. Sustainable agriculture: **04**

Definition, difference between modern and sustainable agriculture, advantages and disadvantages, management practices for sustainable agriculture

8. Vermicompost: **03**

Introduction, materials for preparation of vermicompost , production methodology, advantages of vermicompost

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Agrochemicals and Fertilizers

CCAGF IV (Section B)

Plant diseases and fungicides

(P-IX)

Credits: 02 (Marks: 50) Periods: 45

UNIT-I

1. Diseases of Crops: **18**

Introduction: Definition, Nature, causes of Plant diseases. Reproduction and Dissemination
Types of Diseases
Seed borne diseases.
Soil borne diseases.
Air borne diseases.
Study of major diseases of following crops in Maharashtra state with reference to causal organism, symptoms, and control measures crops: sorghum, wheat, paddy, sunflower, groundnut, cotton, Sugar cane, bajra, Pigeon pea, citrus, mango, Banana, chillies, Brinjal.

UNIT-II

2. Fungicides: **18**

Introduction and definition.
Classification of Fungicides.
Formulation methods
Sulphur Fungicides.
Copper Fungicides
Mercury Fungicides
Systemic Fungicides
Antibiotics
Precautions taken during handling and storage of Fungicides.
Plant Protection equipments, their proper use and maintenance**.**

UNIT-III

3. Methods of application of fungicides: **03**

Seed treatment.
Soil treatment.
Soil drenching.
Broad Cast
Fumigation
Furrow application.
Spraying.
Dusting

UNIT-IV

4. Agrochemicals and pollution: **06**

Introduction & definition.
Types of Pollution.
Pollution due to use of Agrochemicals.
Pesticides/Insecticides
Herbicides
Fungicides
Pesticide residues in the water system and soil.

Reference Books:

1. Manures and Fertilizers By. K.S. Yawalkar J.P. Agarwal, S. Bokde
2. Soil Fertility and Fertilizers by S.L Tisdale , Nelson W.L.
3. Commercial Fertilizers By Collings.
4. Hand Book of Fertilizer Technology by Fertilizer Association of India.
5. Chemistry of Manures and Fertilizers by Mannickam and Mariakulandai
6. Biofertilizers by Soani L. L. Bhandari S.C. Sxena S.N.
7. Biofertilizers by Subba Rao.
8. Hand Book of Agriculture ICAR New Delhi.
9. Manures and Fertilizers by - FAI
10. Analytical Agril. Chemistry by Chopra and Kanwar.
11. Hand Book of Manures and Fertilizers by ICAR New Delhi.
1. Hand Book of Agriculture- ICAR
2. Diseases of crop plants in India- Rangaswami.
3. Environmental chemistry- A.K. De
4. Crop Production and Field experimentation Vaidhya, Khuspe, Sahasra Budhe.
5. Fungicides in plant disease control- Y.L. Nene, P.N. Thapliyal
6. Plant pathology- R.S. Sing.
7. Plant Pathology- Mehrotra.
8. Weed Science- Gupta.
9. Modern plant pathology-S.C. Dube.
10. Chemistry of Insecticides and Fungicides-U.S. Sree Ramula.
11. Methods of Pesticide analysis-U.S. Sree Ramulu.
12. Analytical Agricultural chemistry- Chopra and Kanwar.
13. Chemistry of Herbicides- Homer.
14. Hand book of Agrochemicals- Royal Society(UK)
15. Text book of Applied Entomology- K.P. Shrivastava
16. Modern Entomology by Dr. DB. Tambhare.
17. General and Applied Entomology- Anant Krishnan Nayar.

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B. Sc. Second year Semester Pattern effective from June -2017

Agrochemicals and Fertilizers

Practical Paper: CCAGFP II [CCAGF III & IV (Section A)]

Credits: 02 (Marks: 50)

(Annual practical Based on [CCAGF III & IV (Section A)] (Practical syllabus requires four periods per batch per week for 2 consecutive days.)

(Note: At least 16 practicals are essential)

1. Identification of different Manures and Fertilizers.
2. Estimation of Moisture and mineral matter from organic Manures (FYM/Compost/Oil Cake).
3. Estimation of organic carbon from FYM or Compost (Walklay and Black Method)
4. Estimation of Total nitrogen from FYM/Compost by Micro Kjeldhal's Method)
5. Determination of Acidity (in terms of H2So4) of ammonium Sulphate.
6. Determination of purity percentage of ammonium sulphate.
7. Estimation of water soluble phosphate from super phosphate.
8. Determination of water soluble Calcium from super Phosphate.
9. Estimation of available zinc from Fertilizer sample.
10. Estimation of Manganese from Micro Nutrient carrier
11. Estimation of molybdenum from Micro Nutrient Carrier.
12. Qualitative test for N-P-K Fertilizer
13. Determination of Sulphate from Super Phosphate.
14. Estimation of Available NPK by using Soil testing Kit.
15. Study of Different types of Biofertilizers.
16. Estimation of Copper from Micro Nutrient Carrier.
17. Estimation of Nitrogen from urea.
18. Preparation and use of soil testing kit.
19. Visit to Manure Pit and Bio gas Plant.
20. Visit to Fertilizer Industry and study of their activities.
21. Visit to Fertilizer Testing Laboratory.
22. Estimation of Potassium in Fertilizers by flame photometer.
23. Determination of oil from oilcakes
24. Analysis of rock phosphate
25. Analysis of Ammonium phosphate
26. Analysis of Potassic fertilizers.

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Agrochemicals and Fertilizers

Practical Paper: CCAGFP III [CCAGF III & IV (Section B)]

Credits: 02 (Marks: 50)

(Annual practical Based on CCAGFP III [CCAGF III & IV (Section B)] (Practical syllabus requires four periods per batch per week for 2 consecutive.) (At least 16 Practicals are Essential)

1. Estimation of Copper pesticides by iodometric methods.
2. Estimation of zinc from zinc containing fungicides by EDTA method.
3. Estimation of chlorine from Dichlorophenyl Trichloro ethane (DDT)
4. Estimation of Sulphur from sulphur containing Fungicide.
5. Estimation of hydrolysable chlorine from BHC
6. Determination of moisture content from pesticides/fungicides
7. Estimation of mercury from mercury containing fungicide
8. Determination of percentage purity of zinc fungicide in commercial sample
9. Determination of dissolved carbon dioxide from water sample.
10. Determination of gamma isomer of BHC by column chromatography
11. Determination of chemical oxygen demand (COD) from water sample.
12. Gravimetric determination of zinc as Pyrophosphate from zinc containg funqicide.
13. Collection and identification of plant diseases.
14. Collection and identification of weeds.
15. Collection and identification of insects/pests.
16. Visit to the Agrochemicals Industry.
17. Study and market survey of different agricultural chemicals.
18. Study of Plant protection appliances.
19. Preparation and use of Bordeux mixture.
20. Determination of percentage purity of phosphomidon form commercial sample.
21. Study and application of herbicides (demonstration).
22. Extraction of pesticide/fungicide from plant material.
23. Determination of PH/acidity/alkalinity of the formulation.
24. Isolation of microorganisms/ soil pathogens by culture.
25. Estimation of Fe^{2+} from $FeSO_4$ from micro nutrient carrier.
26. Analysis of Bordeux mixture
27. Estimation of hardness of water
28. Estimation of phosphorus from given sample of organo phosphorus insecticide.

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Agrochemicals and Fertilizers

Skill Enhancement Course SECAGF-I

Weed identification Techniques and their control

Objective: To identify various obnoxious weeds occurring in our region and find their effective control.

Skill component: Weed survey, collection of samples, identification and classification, preservation as herbaria, digital imaging, finding effective control of these weeds.

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Agrochemicals and Fertilizers

Skill Enhancement Course SECAGF-II

Diagnosis of plant diseases and their control

Objective: To diagnose various plant diseases of major crops of our region and finding their effective controls.

Skill components: plant disease survey of major crops of our region, their identification and diagnosis, collection of disease samples, preservation as herbaria, digital imaging, study of causal organisms, finding effective strategies for their control.