



RAFFLES
UNIVERSITY

TEACHING PLAN: Agrochemicals

Name of the Faculty: Dr. Amit Yadav

SCHOOL: (SOAS) SCHOOL OF AGRICULTURAL SCIENCES		ACADEMIC SESSION: 2023 – 2024		FOR STUDENTS’ BATCH: 2 nd Year Sem. 4 th		
1	Course No.	AET-T-201/AET-P-201				
2	Course Title	Agrochemicals				
3	Credits	3+1				
4	Learning Hours		Contact Hours	72		
			Assessment	9		
			Guided Study	9		
			Total hours	90		
5	Course Objective	1. To impart advanced knowledge about fertilizers and pesticides. 2. To understand the calculation of concentration and dosage of fertilizers and pesticides. 3. To impart knowledge regarding fertilizer logistics and marketing.				
6	Course Outcomes	1. Understand the role of agrochemicals in agriculture and its management for sustainable agriculture. 2. Recognize various classes of Herbicides, Fungicides , Fertilizers and their importance in agriculture 3. Examine Insecticide Act and rules, Insecticides banned, withdrawn and restricted use, Fate of insecticides in soil & plant 4. Analyze the Manufacturing of Mixed and complex fertilizers, Fertilizer logistics and marketing.				
7	Outline syllabus:					
7.01	Paper Code	Unit	Introduction		Page Numbers ¹	Lect ures
7.02	AET-T-201	Unit I	1. An introduction to agrochemicals, their type and role in agriculture, effect on environment, soil, human and animal health. 2. Merits and demerits of their uses in agriculture, management of agrochemicals for sustainable agriculture. 3. Herbicides- Major classes, properties and important herbicides. 4. Fate of herbicides. 5. Fungicides - Classification – Inorganic fungicides characteristics, preparation and use of sulfur and copper. 6. Mode of action-Bordeaux mixture and copper oxychloride.			
		Unit II	1. Organic fungicides- Mode of action-Dithiocarbamates- characteristics, preparation and use of Zineb and maneb. 2. Systemic fungicides- Benomyl, carboxin, oxycarboxin, Metalaxyl, Carbendazim, characteristics and use. 3. Introduction and classification of insecticides: inorganic and organic insecticides Organochlorine, Organophosphates, Carbamates, Synthetic pyrethroids Neonicotinoids, Biorationals. 4. Insecticide Act and rules, Insecticides banned,			

			withdrawn and restricted use. 5. Fate of insecticides in soil & plant. 6. IGRs Bio pesticides, Reduced risk insecticides, Botanicals, plant and animal systemic insecticides their characteristics and uses.		
		Unit III	1. Fertilizers and their importance. 2. Nitrogenous fertilizers: Feedstocks and Manufacturing of ammonium sulphate, ammonium nitrate, ammonium chloride, urea. 3. Slow release N-fertilizers. 4. Phosphatic fertilizers: feedstock and manufacturing of single superphosphate. 5. Preparation of bone meal and basic slag. 6. Potassic fertilizers: Natural sources of potash, manufacturing of potassiumchloride, potassium sulphate and potassium nitrate.		
		Unit IV	1. Mixed and complex fertilizers: Sources and compatibility–preparation of major, secondary and micronutrient mixtures. 2. Complex fertilizers: Manufacturing of ammonium phosphates, nitrophosphates and NPK complexes. 3. Fertilizer control order. 4. Fertilizer logistics and marketing. 5. Plant bio-pesticides for ecological agriculture, Bio-insect repellent.		
8	Course Evaluation				
8.1	CA: 20%				
8.1.1	Attendance	25 %			
8.1.2	Homework	2 Assignments, 50%			
8.1.3	Quizzes	2 Quizzes, 25%			
8.1.4	Projects	-			
8.1.5	Presentation	-			
8.1.6	Any other	Practical Examination- 30%			
8.2	MTE	20%			
8.3	End-term examination: 30%				
9	Text Books & References				
9.1	Text book	1. Text Book of Entomology, By J S Jagannath, AIB Saliha Publications, Tamil Nadu, India ISBN: 978-81-950231-4-1			
9.2	References	1. Basic Entomology, By Sunil Kumar Yadav, New Vishal Publications, 2017 2. Handbook of Entomology, By Dr. T V Prasad, 4 th Edition, New Vishal Publications 3. Fundamentals of Agricultural Entomology, By P K Sehgal, Kalyani Publications 2017			
9.3	Video References	1. 2.			

Outcome no. → Syllabus topic↓	1	2	3	4
Paper Code.Unit I (1)	✓			
Paper Code. Unit I (2)	✓	✓	✓	✓
Paper Code. Unit I (3)	✓			
Paper Code.Unit I (4)	✓			
Paper Code. Unit I (5)	✓			
Paper Code. Unit I (6)	✓			
Paper Code.Unit II (1)	✓	✓	✓	✓
Paper Code. Unit II(2)	✓		✓	✓
Paper Code. Unit II(3)	✓	✓		
Paper Code.Unit II (4)	✓	✓		
Paper Code. Unit II(5)	✓	✓		
Paper Code. Unit II(6)	✓	✓		
Paper Code.Unit III (1)	✓	✓	✓	✓
Paper Code.Unit III (2)	✓			
Paper Code.Unit III (3)	✓			

Paper Code,Unit III (4)	✓			
Paper Code,Unit III (5)	✓			
Paper Code,Unit III (6)	✓			
Paper Code,Unit IV (1)	✓		✓	✓
Paper Code,Unit IV (2)	✓	✓		
Paper Code,Unit IV (3)	✓		✓	✓
Paper Code,Unit IV (4)	✓	✓		
Paper Code,Unit IV (5)	✓	✓		

QUESTION BANK

UNIT I Objective Questions

1. The first chemical shown to have herbicidal activity

a). 2,4-D

b). Bordeaux mixture

c). Paraquat

d). 2,4- DB

2. The herbicidal activity of 2,4-D at the first time was reported by

a). Hammer and Tukey (1944)

b). Zimmernam and Hitchcock (1942)

c). Nutman and Blackman (1945)

d). None

3. a latest herbicide family

a). Triazines

b). Dinitroanilines

c). Sulfonyl ureas

d). Growth regulators

4. The effective control of morphological similar Phalaris minor in wheat is achieved with

a). 2,4-D

b). Glyphosate

c). Metsulfuron - methyl

d). Isoproturon

5. Which of the following gives effective control of Phalaris minor in wheat

a). Hand weeding

b). Inter-cultivation

c). Flaming

d). Clodinafop-proparygyl

Definitions

1. Agrochemicals
2. Insecticides
3. Weedicides
4. Fungicides
5. Fertilizers

Short Notes

1. Write the importance of agrochemicals.
2. Describe about the agrochemicals effect on environment.
3. Explain the agrochemicals effect on soil.
4. Make clear about the agrochemicals effect on human and animal health.
5. Merits and demerits of agrochemicals in agriculture

Descriptive Questions

1. Explain the Herbicides and their major classes and properties.
2. Describe about the fate of herbicides.

3. Make clear about the classification of fungicides –
4. What are the characteristics of inorganic fungicides characteristics
5. Mode of action-Bordeaux mixture.

UNIT II

Objective Questions

1. Rotenone is a

- a) Insect hormone
- (b) Natural insecticide
- (c) Bioherbicide
- (d) Natural herbicide

Answer: (b)

2. The wild growth of _____ is checked with Cochineal insect

- (a) Screwworm
- (b) Aphids
- (c) Eichhornia
- (d) Opuntia

Answer: (d)

3. Pyrethrin is extracted from

- (a) *Poa indica*
- (b) *Helianthus annuus*
- (c) *Azadirachta indica*
- (d) *Chrysanthemum cinerariifolium*

Answer: (d)

4. This is an effective plant insecticide

- (a) Nicotine
- (b) Cinerin
- (c) Pyrethrin
- (d) all of these

Answer: (d)

5. Which of the following is used to prevent germination of fungal spores?

- (a) Fungicides
- (b) Insecticides
- (c) Nematicides
- (d) Acaricides

Answer: (a)

Definitions

1. Organic fungicides
2. Systemic fungicides
3. Neonicotinoids
4. Biorationals
5. IGRs Bio pesticides

Short Notes

1. Write the importance of Organic fungicides
2. Describe about the preparation and use of zineb.
3. Explain the preparation and use of maneb.
4. Make clear about the classification of insecticides.
5. Merits and demerits of Synthetic pyrethroids.

Descriptive Questions

1. Explain the insecticide Act and rules and insecticides banned.
2. Describe about the fate of insecticides in soil & plant.
3. Make clear about the Organophosphates

4. What are the Botanicals, plant and animal systemic insecticides their characteristics and uses.
5. Merits and demerits of insecticides in agriculture

UNIT III

Objective Questions

1. Which one of the following is a straight fertilizer?

- (a) Ammonium sulphate.
- (b) Potassium nitrate.
- (c) Ammonium potassium phosphate
- (d) All of the above.

2. Which type of fertilizer is DAP?

- (a) Binary
- (b) Ternary.
- (c) Compound or complex.
- (d) None of the above.

3. Which is the most hygroscopic fertilizer?

- (a) Urea.
- (b) Ammonium nitrate.
- (c) Ammonium sulphate.
- (d) Ammonium sulphate nitrate.

4. What is the equivalent acidity of anhydrous ammonia?

- (a) 128.
- (b) 110.
- (c) 80-84.
- (d) 148.

5. What is the N content of sunflower cake?

- (a) 7.2%.
- (b) 7.8%.
- (c) 6.5%.
- (d) 5.5-5.8%.

Definitions

1. Ammonium sulphate
2. Single superphosphate
3. Bone meal and Basic slag
4. Potassium sulphate
5. Natural sources of potash

Short Notes

1. Write the importance of fertilizers.
2. Describe about the fertilizers effect on environment.
3. Explain the fertilizers effect on soil.
4. Make clear about the fertilizers effect on human and animal health.
5. Merits and demerits of fertilizers in agriculture

Descriptive Questions

1. Explain the fertilizers and their importance.
2. Describe about the fate of fertilizers.
3. Make clear about the slow release N-fertilizers.
4. What are the phosphatic fertilizers?

UNIT IV
Objective Questions

1. NPK fertilizer is a _____ fertilizer.
(a) Ammonium sulphate.
(b) Potassium nitrate.
(c) Mixed
(d) All of the above.
2. Which of the following fertilizers is required for the development of fibrous materials of the plants and of the sugar of vegetable & fruits?
(a) Nitrogenous fertilizers
(b) Phosphatic fertilizers
(c) Potassic fertilizer
(d) None of the above.
3. Red phosphorous is changed into white phosphorous by
(a) Urea.
(b) Vaporization followed by condensation
(c) Melting under pressure
(d) None of the above.
4. Dehydration of ammonium carbamate to yield urea is a/an _____ reaction.
(a) Exothermic
(b) Endothermic
(c) Autocatalytic
(d) Catalytic
5. Nitrogen content in ammonium sulphate (a fertiliser) is around _____ percent.
(a) 5
(b) 20
(c) 50
(d) 65

Definitions

1. Mixed fertilizers
2. Complex fertilizers
3. NPK complexes
4. Bio-insect repellent
5. Nitrophosphates

Short Notes

1. Write the importance of Complex fertilizers.
2. Describe about the Complex fertilizers effect on environment.
3. Explain the fertilizers effect on soil.
4. Make clear about the Plant bio-pesticides effect on human and animal health.
5. Merits and demerits of Mixed fertilizers in agriculture

Descriptive Questions

5. Explain the Sources and compatibility–preparation of major, secondary and micronutrient mixtures.
6. Describe about the manufacturing of ammonium phosphates.
7. Make clear about the fertilizer control order.
8. What are importance plant bio-pesticides for ecological agriculture?