Course overview

The course on manures, fertilizers and agrochemicals will give a broad idea about the manures, importance of manures, different types of manures, sources, compost preparation, methods, benefits and their role in sustaining soil productivity. Nowadays under intensive agriculture use of fertilizers become inevitable to get yield of crop produces. Knowledge on fertilizers, types of fertilizers, their nutrient contents, form and method of manufacturing and their reaction in soil, FCO and fertilizer storage will be of much useful both at field level as well as in the industry.

Theory Syllabus


Fertilizers-classification-Manufacturing processes and properties of major nitrogenous, phosphatic potassic and complex fertilizers- their fate and reactions in the soil-Secondary and micronutrient fertilizers-Amendments. Biofertilizers and their advantage-Fertilizer control order- Fertilizer storage

Organic chemistry as prelude to agrochemicals- Diverse type of agrochemicals-Botanical insecticides-Pyrethrum-Synthetic pyrethroids. Synthetic organic insecticides-Major classes- synthesis and properties of some important insecticides under each class. Herbicides-Major classes-Synthesis and properties of 2,4-d, atrazine, glyphosate, butachlor and benthiocarb. Fungicides-Major classes-synthesis and properties of carbendazim, carboxin, captantridemorph and copper oxy chloride- insectides act-plant growth regulators.

Practicals

Total nitrogen and phosphorus in manures / composts-Ammoniacal and nitrate nitrogen- water soluble P$_2$O$_5$, potassium, calcium, sulphur and zinc contents of fertilizers COD in organic wastes- Adulteration in fertilizer. Argentimetric and iodometric titrations- their use in analysis of lindane , metasystox, endosulphan, malathion, copper and sulphur fungicides- Compataibility of fertilizers with pesticides
Unit-I

**Manures:** Definition – types – composition and value – sources and production of manures – Compost- Different composting technologies-Mechanical compost plants- Vermicomposting-Green manures-Oilcakes-Sewage sludge-Biogas plant slurry-Plant and animal refuges.

**Unit II**

**Fertilizers-classification:** Nitrogenous, phosphatic and potassic fertilizers

**Nitrogenous fertilizers:** Organic N forms, Synthetic N fertilizers – Manufacturing of ammonium sulphate, ammonium chloride, ammonium nitrate and urea.

**Phosphatic fertilizers:** P fertilizer sources – processing rock phosphate, bones for bone meal preparation – basic slag – preparation of single, triple super phosphate and thermo-phosphate.

**Potassic fertilizers:** K fertilizer – natural sources – manufacturing of potassium chloride, potassium sulphate and potassium nitrate.

**Unit III**

**Mixed and complex fertilizers:** Sources and compatibility – preparation of major, secondary and micronutrient mixtures. Complex fertilizers – manufacturing of ammonium phosphates, nitro phosphates and NPK complexes. Biofertilizers and their advantage-Fertilizer control order and fertilizer storage

**Unit IV**

Organic chemistry as prelude to agrochemicals-Diverse type of agrochemicals - Botanical insecticides-Pyrethrum-Synthetic pyrethroids- Synthetic organic insecticides-Major classes- synthesis and properties of some important insecticides under each class.

**Unit V**

Herbicides-Major classes-Synthesis and properties of 2,4-D, atrazine, glyphosate, butachlor and bentiocarb.- Fungicides- Major classes- synthesis and properties of carbendazim, carboxin, captantridemorph and copper oxy chloride- Insecticides act and plant growth regulators.

**Lecture Schedule:**

1. Manures – types, composition and value - sources
2. Green manures-Oilcakes-Sewage sludge-Biogas plant slurry-Plant and animal refuges
3. Composting of organic wastes – composting technologies
4. Classification of fertilizers – N, P and K fertilizers
5. Nitrogenous fertilizers – sources – fundamental processes involved in manufacturing procedures for ammonia, sulphuric acid, nitric acid and phosphoric acid
6. Manufacturing of ammonium sulphate, ammonium nitrate and ammonium chloride
7. Manufacturing of urea
8. Slow release N fertilizers – chemically modified forms – urea-formaldehyde, IBDU, CDU.
9. Controlled release fertilizers and reaction in soil - nitrification inhibitors – criteria and advantages
12. Potassic fertilizers – manufacturing of KCl, K₂SO₄ and schoenite
13. Secondary and micronutrient fertilizers - Manufacturing Zinc sulphate, and ferrous sulphate
15. Mixed fertilizers – sources – preparations- their compatibility – advantages
16. Amendments-calcium sulphate and calcium carbonate
17. Midsemester examination
18. Biofertilizers- symbiotic and non symbiotic and their advantage
19. Impact of fertilizers on the environment
20. Fertilizer control order and Fertilizer storage
21. Organic chemistry as prelude to agrochemicals - Diverse type of agrochemicals
22. Pesticides formulations - sprays - emulsion concentrates- water miscible liquids-dusts - wettable powders and flowables - manufacture, characteristics and uses.
25. Carbamates - characteristics, preparation and use of Carbaryl, carbofuran, carbosulfan and aldicarb.

28. Herbicides - Mode of action - Classification of organic herbicides - Characteristics - Use of 2, 4-D, Butachlor, Glyphosate, Atrazine and Benthocarp

29. Fungicides - Classification - Inorganics - characteristics, preparation and use of sulfur and copper - Mode of action - Bordeaux mixture and copper oxychloride


31. Systematic fungicides - Benomyl, carboxin, oxycarboxin, Metalaxyl, Carbendazim, characteristics and use.

32. Insecticide act-Compatibility of pesticides with fertilizers and other Agrochemicals.

33. Fate of pesticides in soil and plant.

34. Plant growth regulators

References