SSAC 222 MANURES, FERTILIZERS AND AGROCHEMICALS (2+1)

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. Nowdays 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

Introduction- Raw materials- Manufacturing processes-Formulations-Manures-Bulky and concentrated-FYM-Compost-Different methods-Mechanical compost plants-Vermicomposting-Green manures-Oilcakes-Sewage sludge-Biogas plant slurry-Plant and animal refuges.

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-Fertilzer 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-Majior 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_2O_5,potassium,calcium,sulphur and zinc contents of fertilizers COD in organic wastes- Adulteration in fertilizer. Argentimetric and iodometric rtitrations- 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 benthiocarb.- Fungicides- Majior classes- synthesis and properties of carbendazim, carboxin, captantridemorph and copper oxy chloride- Insectides 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
10. P fertilizers – rock phosphate – bone meal – basic slag
11. Single and triple super phosphates – thermosphosphates – method of manufacturing
12. Potassic fertilizers –manufacturing of KCl, K_2SO_4 and schoenite
13. Secondary and micronutrient fertilizers- Manufacturing Zinc sulphate, and ferrous sulphate
14. Complex fertilizers – manufacturing ammonium phosphates – nitro phosphates and NPK complexes
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.
23. Pesticide formulation - granules, fumigants and aerosols - Manufacture - Characteristics and use. Insecticide classification - Organochlorines - Mode of action - lindane, endosulfan - Characteristics and use.
24. Organophosphates - characteristics, preparation and use of monocrotophos, phosphamidan, and chlorpyriphos. Phorate, phosalone, dimethoate and quinalphos.
25. Carbamates - characteristics, preparation and use of Carbaryl, carbofuran, carbosulfan and aldicarb.
26. Botanicals - characteristics, preparation and use of neem products, nicotine and pyrethrum.

27. Characteristics, preparation and use of synthetic pyrethroids – Fenvalerate and Cypermethrin.
28. Herbicides - Mode of action -Classification of organic herbicides - Characteristics - Use of 2, 4-D. , Butachlor, Glyphosate, Atrazine and. Benthiocarp
29. Fungicides - Classification - Inorganics - characteristics, preparation and use of sulfur and copper - Mode of action - Bordeaux mixture and copper oxychloride
30. Organic fungicides - Mode of action - Dithiocarbamates - characteristics, preparation and use of Zineb and maneb.
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

1. Buchel, K. H. 1983 Chemistry of pesticides. John Wiley and Sons New York.

2. Collings G. H. 1955 Commercial Fertilizers. Mc Graw Hill Publishing Co. New York.

3. Geroge W. W 1986. Fundamentals of pesticides A self-instruction Guide. Thomas publication P.O. Box 9335. Frenocalifornia.

4. Sree Ramulu, U. S. 1979. Chemistry of Insecticides and Fungicides. Oxford and IBH Publishing House Co. New Delhi.