Crop Nutrient Manager (CRMN)
Core Qualification File Syllabus

Details of Theory Syllabus

Sl. No.	CONTENT	DETAILS
1.	Introduction to plant nutrients (4Hrs)	1.1. Definition of plant nutrients, List of essential plant nutrients and their classification 1.2. Criteria of essentially, available forms/forms in which nutrients for plants, functional and beneficial elements for plants
2.	Importance, roles, sources, availability of different plant nutrients. (2Hrs)	2.1. Importance and role of different plant nutrients. 2.2. Deficiency and toxicity symptoms of different plant nutrients. 2.3. Different sources of plant nutrients. Factors affecting nutrient availability 2.4. Loss of plant nutrients from the soil. 2.5. Soil fertility and productivity
3.	Illustrate manures and fertilizers, their types, nutrient content etc. (8Hrs)	3.1. Definition and types of manures and their nutrient content [bulky organic manure, concentrated organic manures, green manure, liquid manure] 3.2. Differences between manure and fertilizer 3.3. Definition and types of commercial fertilizers and their nutrient content [commercial N fertilizers, P fertilizers, K fertilizers, complex fertilizers]. 3.4. Fertilizer grade, Fertilizer ratio, Conditioner, Filler etc.
4.	Illustrate FYM, different Composts, vermicompost, their preparations Bio-fertilizers etc. (32Hrs)	4.1. Preparation procedure of manures; FYM, Compost 4.2. Merits / Demerits of different methods. Tips for judging the completion of composting method. 4.3. Vermicompost, methods of preparation and its advantages. 4.4. Precautions to be taken during preparation of organic manures / bio-fertilizers. Enriched compost / vermicompost 4.5. Bio-fertilizers [*Rhizobium, Azotobacter, Azospirillum*, VAM, PSB/PMB], Seed treatment with bio-fertilizers, Cross inoculation group. 4.6. Importance of organic manure in present day agriculture and benefits of organic source of plant nutrients.
5.	Explain proper methods and time of application of manure/ bio-fertilizers/ fertilizers. (6Hrs)	5.1. Methods and time of application of manure/ bio-fertilizers 5.2. Methods [Broadcasting, Drilling and placement, Plough sole placement, Deep placement, Sub-soil application etc.] and time of application of commercial fertilizers [basal application, top dressing, fertigation, foliar application]. 5.3. Secondary nutrients, Trace elements / Micro-nutrients [their sources and crop specific uses]
6.	Able to demonstrate General recommendations of manures and	6.1. General recommendations of manures 6.2. General recommendations of fertilizer management for increasing fertilizer use efficiency (FUE) inputs in crop fields. 6.3. Agronomic interventions for enhancing FUE.

	fertilizer (6Hrs)	6.4. Soil amendments and their role in nutrient availability.
7.	Illustrate professional skill on Integrated Nutrient Management (8Hrs)	7.1. Definition of Integrated Nutrient management (INM), Advantages and disadvantages of INM 7.2. Balanced nutrition for sustainable crop production 7.3. Integrated Nutrient Management of major field crop (Paddy, Wheat, Potato, Mustard, Greengram, Groundnut, Sesame, Sunflower etc.)
8.	Economics (6Hrs)	8.1. Minimum support price for manures, fertilizers 8.2. Price of different types of compost, vermicompost, azolla and export quality standards 8.3. Cost of production, gross return, net income and benefit : cost ratio
	TOTAL	**72 Hrs**

Detail of Practical Syllabus

SL NO	CONTENT (Any Eight)	DETAILS
1.	Identification of different nutrient sources [commercial fertilizers, organic manures] (10Hrs)	1.1. Study on different green manures, green leaf manures crops, seeds and their nutrient content 1.2. Study on different fertilizers and their nutrient content [Urea, DAP, MOP, Ammonium sulphate, Potassium Sulphate,10:26:26 etc.] 1.3. Simple mathematical calculation of manures and fertilizers requirements as basal, topdressing and foliar application 1.4. Diagnosis of nutrient deficiency and toxicity symptoms
2.	Selection of composting materials & Compost preparation [Different methods] (10Hrs)	2.1. Select land suitable land raw materials of composting materials 2.2. Demonstration different composting methods (Bangalore method, Coimbatore method etc.) 2.3. Practicals on judging the completion of composting methods. 2.4. Enriched compost 2.5. NADEP method of composting 2.6. Use of waste decomposer in composting methods
3.	Preparation of vermicompost [Different methods – bed / pit / wooden box], Preparation of liquid manure (36Hrs)	3.1. Identification of different earthworms used for vermicomposting 3.2. Vermicomposting methods 3.3. Precautions of vermicomposting 3.4. Vermiculture, 3.5. Vermicast and vermiwash preparation 3.6. Enriching vermicompost 3.7. Visit nearest small/commercial vermicompost units 3.8. Preparation of different liquid manures 3.9. Preservation and storage of different liquid manures 3.10. Visit nearest small/commercial liquid manures production units
4.	Application of compost / vermicompost / liquid manure /bio-fertilizers / fertilizers in crop field / individual plot (10Hrs)	5.1. Green manuring *in-situ* and *ex-situ* 5.2. Green leaf manuring 5.3. Understand and practice of different methods of manures and fertilizer application 5.4. Understands the practical application of INM 5.5. Precautions for manures and fertilizer application 5.6. Simple mathematical calculation of Nutrient use efficiency, Physiological efficiency, Agronomic efficiency etc.
6.	Pot study on	6.1. Pot culture for different nutrient deficiency symptoms in major field

	nutrient deficiency symptoms (8Hrs)	crops 6.2. Measures to mitigate different nutrient deficiency symptoms
7.	Study on storing of commercial fertilizers / Packaging of organic manures & calculations for amount and cost of fertilizer application] (6Hrs)	7.1. Understand the storage principle of manures and fertilizers 7.2. Understand the packaging of manures 7.3. Simple calculations for doses of nutrients, amount of fertilizers, cost of fertilizer application [for important field / horticultural crops] 7.4. Visit nearest regional market for manures and fertilizers and understand the supply-chain and price variation
8.	Projects (16 Hrs)	8.1 Any two projects each of 8 Hrs.
Total		**96 Hrs.**

Details of Project (Any two)

Sl. No.	Content (Any two, each 8Hrs.)	Details
1.	Project I (8 Hrs)	Project on a model vermicompost unit development and production [Example: Vermicompost unit establishment, production, packaging, marketing and economics]
2.	Project II (8 Hrs)	Project on a model liquid manure preparation unit [Example: Unit establishment, production, storage, marketing and economics]
3.	Project III (8 Hrs)	Project on a model compost preparation unit [Example: Unit establishment, production, storage, marketing and economics]
4.	Project IV (8 Hrs)	Project on a soil testing unit [Example: Establishment of soil testing unit, promotion and economics]
5.	Project V (8 Hrs)	Project on a INM unit / plot

OUTCOMES

Outcomes to be assessed	Assessment criteria for the outcome
1. Identify the plant nutrients, roles, sources and importance of nutrients for soil fertility and productivity.	(1.1) Recognize and list out different plant nutrients (1.2) Explain the criteria of essential of plant nutrients. (1.3) Describe different essential, functional and beneficial nutrients. (1.4) Explain the roles of different plant nutrients (1.5)Identify the deficiency and toxicity of different plant nutrients. (1.6) List out the factors affecting nutrient availability and loss of plant nutrients from the soil. (1.7) Differentiate between soil fertility and productivity.
2. Illustrate manures and fertilizers, their types, nutrient content etc.	(2.1) Identify the different types of manures and their nutrient content [bulky organic manure, concentrated organic manures, liquid manure]. (2.2) Explain the difference between manures and fertilizers (2.3) Identify types of commercial fertilizers and their nutrient content [commercial N fertilizers, P fertilizers, K fertilizers, complex fertilizers], their sources and suitability for different soil types. (2.4) Describe the importance of organic manure in present agriculture. (2.5) Calculate the manures and fertilizers requirement of major field crops for the unit area.
3 Describe Farmyard Manure, different Composts, vermicompost, their preparations Bio-fertilizers.	(3.1) Select different procedures of green manuring, green leaf manuring (3.2) Demonstrate green manuring in-situ and ex-situ (3.3) Explain different methods of composting, their merits and demerits. (3.4) Identify different types of green manuring seeds and crops. (3.5) List out the names of common manures (like cattle dung, rural compost, farmyard manure, vermicompost, etc.) along with their nutrient content, doses and time of application. (3.6) Demonstrate the FYM preparation. (3.7)Identify different earthworms and vermicomposting methods, rearing, preservation and carrying of earthworms. Assessor will note whether the trainee is able to answer different vermicomposting enrichment procedures and precautions. (3.8) Demonstrate manure application in the field. (3.9) Explain about biofertilizers [*Rhizobium, Azotobacter, Azospirillum*, VAM, PSB/PMB] and their crop specific application. They will be asked to demonstrate the seed treatment technique with bio-fertilizers. (3.9) Explain the functions of different biofertilizers in crop production. (3.10) Explain importance of organic manure in present day agriculture and benefits of organic source of plant nutrients.
4. Select proper methods and time of application of manure/ bio-fertilizers/ fertilizers.	(4.1) Determine the methods and time of application of manure/ bio-fertilizers based on crop growth stage and soil fertility status. (4.2) Explain the methods and time of application of commercial fertilizers [basal application, top dressing, fertigation, foliar application]. (4.3) Identify the needs of secondary, trace elements and their need of application in proper time, methods and sources. (4.4) Explain the crop specific requirements of micro-nutrients based

	on soil conditions.
5. Implement the recommendations of manures and fertilizer	(5.1) Demonstrate application of manures in crop fields. (5.2) Illustrate the recommendations of fertilizer management for increasing fertilizer use efficiency (FUE) inputs in crop fields. (5.3) Describe agronomic interventions for enhancing FUE. (5.4) Illustrate different soil amendments. (5.5) Demonstrate the methodology of soil amendment application.
6. Illustrate professional skill on Integrated Nutrient Management	(6.1) Explain the definition of Integrated Nutrient management (INM), Advantages and disadvantages of INM. (6.2) Formulate Integrated Nutrient Management of major field crop (Paddy, Wheat, Potato, Mustard, Greengram, Groundnut, Sesame, Sunflower etc.).
7. Illustrate economics calculation ability for cost of production, net income and benefit.	(7.1) Calculate the minimum support price for manures, fertilizers (7.2) Evaluate the performance of the trainee to calculate the economics of different types of compost, vermicompost, azolla and export quality standards (7.3) Explain the Cost of production, gross return, net income and benefit: cost ratio of different crop production technology considering nutrient management as variable.