National Vocational Certificate Level 2 in Agriculture (Chilli Production)

CBT Curriculum

NATIONAL VOCATIONAL & TECHNICAL TRAINING COMMISSION

NAVTTC نیوٹک

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Table of contents

1. INTRODUCTION

1.1 Description of the structure of the course

Following is the structure of the course:

Module #	Title	Theory (hours)	Practical (hours)	Total (hour)
1	Selection, treatment and storage of suitable seed	38 hours	162 hours	200 hours
2	Carryout land preparation and management	18hours	72hours	90 hours
3	Carryout weed management	20hours	85hours	105hours
4	Carryout fertilizer management as per soil condition	15hours	60hours	75 hours
5	Carryout pest management	20 hours	65hours	85hours
6	Carryout harvesting and post harvesting management	45 hours	200 hours	245hours

1.2 Duration of the course:

The proposed curriculum is composed of 6 modules that will be covered in 800 hrs. It is proposed that the course may be delivered in six months period (Five days a week).Training can also be scheduled on part time bases or in the evening classes. The distribution of contact hours is given below:

Total	800 hrs.
Theory	156 hrs. (20%)
Practical	644 hrs. (80%)

1.3 Purpose of the training programme:

The purpose of the training is to provide skilled manpower to improve the existing crop production and protection practices. This will increase the on-farm productivity, resulting in producing better quality and will ultimately bring economic benefits to the producer.

1.4 Specific characteristics of this training programme:

- The training programme shall be organized in an institute that has a field area for growing of chillies or a nearby chilli growing area.
- This training programme will be more productive for the farmers who may already be involved in chilli production.
- The training program shall be more effective and beneficial if the trainers have experience and knowledge about chilli production, protection and other aspects of handling.

1.5 Main objectives of the training programme

Following are the main objectives of the training programme:

- Capacity building in trainees for adopting good agricultural practices in all stages of chilli production with higher yields and to prevent contamination of unwanted materials, organisms and substances in the harvest.
- To develop characteristics such as self reliance, reliability, responsibility, team sense and ability to lead the program in the field.
- To maximize chilli production using improved procedures of cultivation
- To protect the harvest during picking, drying, storage and marketing.

1.6 Skill development by action orientation:

The student must have the following skills after action orientation:

- The ability to collaboratively lead to a positive community change and improvement in the system
- Ensure hygienic practices at work
- Contribute in creating an environment that leads to the safe handling of product
- Perform tasks in a responsible manner
- Develop a sense of duty

1.7 Entry level of trainees

- Middle preferably Matric
- Traceable reference
- Minimum age limit for trainees will be 14 or above 14 years

1.8 Minimum qualification for teachers

Minimum qualification for trainers should be a graduate degree in agriculture or related subject. The main aim of training providers is to develop work related skills and competency through comprehensive action orientation. This includes the willingness and ability of a student to act appropriately and professionally in different situations at work. The willingness and ability of students depends largely on the teacher‟s skills to perform goal-oriented tasks. This can be achieved by putting their technical knowledge and skills to use by developing a programme of practical assessment that reflects learning outcomes given in the curriculum.

The trainer will also support students in developing personal characteristics such as self reliance, reliability, responsibility, group sense and the ability to lead. An understanding of hygiene and sanitary conditions and its impact on society is required. The adoption of suitable practices during all stages of chilli production to avoid contamination of unwanted materials, organisms, substances should be the focal area of teaching.

1.9 Medium of instruction

Urdu, local language

1.10 Laws and Regulations

- Good Agricultural Practices
- Good Harvesting Practices
- Good Storage Practices

- Pakistan Standard and Quality Control Authority (PSQCA). 2009. Standard Development Center, Agriculture and Food Division,
- Codex General Standard for contaminants and toxins in food and feed. Codex Stan 193-1995 http://www.codexalimentarius.org/member-observers/en/
- Commission Regulation (EU). 2010. No.165/2010 of 26 February 2010 amending Regulation (EC) No 1881/2006 setting maximum levels for certain contaminants in foodstuff as regards aflatoxins (Text with EEA relevance).
- Hazard Analysis Critical Control Point (HACCP)

1.11 Recommended teaching materials

- Manual on the application of the HACCP system in mycotoxin prevention and control. FAO Food and Nutrition Paper 73.
- Cultivation of Chillies in Sindh, Pakistan published by Shan Foods (Pvt) ltd in collaboration with PARC.
- Cultivation of vegetable in Sindh, Pakistan. By A W Khoso.
- A research paper entitled “Impact of discoloration and picking practices of red chillies on aflatoxins levels” by Sahar, N., Arif, S., Afzal, Q., Ahmed, M., Ara, J. and Chaudhry Q. Published in International Journal of Botany. 2013. 45(5):1669-1672.

1.12 Suggested distribution of modules

Following is the suggested sequence of modules:

Module-1: Selection, treatment and storage of suitable seed
Module-2: Carryout land preparation and management
Module-3: Carryout weed management
Module-4: Carryout fertilizer management as per soil condition
Module-5: Carryout pest management
Module-6: Carryout harvesting and post harvesting management

The sequence of modules 2, 3, 4 and 5 are interchangeable.

1.13 Definition of the trade

Chillies produced using traditional practices are liable to quantitative and qualitative deteriorations that ultimately results into economic losses for the grower and to the exports. Moreover, the presence of toxins in the harvest has an impact on the health of consumers. This course aims to increase the chilli productivity by adopting modern and systematic methods of cultivation. It also aims to protect the harvest from developing toxic chemicals that cause health concerns through advancements in the picking, drying, storage and marketing practices. The course will develop expertise in the stake holders of chilli production and initial processing by providing them with specific training keeping in view their job requirements.

1.14 Competencies gained after completion of the course

The student must have the following competencies:

- Select healthy and appropriate seeds for chilli production
- Identify the appropriate chilli lots for the production of seed and and the subsequent handling and processing
- Select and prepare land for sowing of chilli seeds following appropriate procedures.
- Apply the suitable weedicides for the removal of weeds in the chilli fields.
- Select and timely apply suitable fertilizers as per soil requirement.
- Monitor the crop for insect pests and to control them by applying appropriate procedures.
- Pick the ripened chilli timely and then transfer them safely to the drying fields with all possible care and precautions.
- Select and prepare the drying yards for the harvest and to undertake drying as per requirement by adopting appropriate procedures.
- Recognize the damaged chillies in the field and during subsequent production stages and be able to handle them using suitable procedures.
- Inspect and select the sites for storage of seeds and dried chillies and store the harvest using recommended procedures.

1.15 Worker trades

- Good health
- Data recording and analytical skills
- Hardworking

- Team spirit and ability to manage the farm workers
- Desire to produce results

1.16 Opportunities for employment and advancement

Chillies are an important cash crop of Sindh, with an average production of about 137000 tons annually utilizing an area of about 64900 hectares. About 90% of the chillies produced in Pakistan are cultivated in Sindh. In the past substantial quantity of the produce was exported with annual earnings of millions of dollars. However during the past few years the situation has changed and as a result of detection by aflatoxins, many countries has stopped the import of chillies from Pakistan. Moreover, the production has also not remained competitive to the international market due to poor per hectare yields. The chilli farmers are quite aware of the situation and there is a dire demand from the growers for providing the technical support for the production of chillies and its post harvest management. The induction of trained man power in the system is likely to bring improvements in the system as they will be taken up and employed by different stake holders in chillies business. It is anticipated that need of such persons is enormous and they will be hired by producers and processors at reasonable and competitive rates.

2. OVERVIEW OF THE CURRICULUM FOR CHILLI PRODUCTION

Module Title and Aim	Learning Units	Theory[1] Days/hours	Workplace[2] Days/hours	Timeframe of modules
Module 1: Selection, treatment and storage of suitable seed **Aim:**To select, treat and store suitable seed for crop production	**LU-1:** Select appropriate lots for producing seeds / or procure registered seeds **LU-2:** Segregate the appropriate pods on the basis of their physical appearance **LU-3:** Extract the seeds from selected chilli pods and separate the undersized seeds using appropriate procedure **LU-4:** Undertake seed treatment **LU-5:** Pack and tag the seeds **LU-6:** Inspect and select the site for storage of seeds and store the seeds under proper conditions keeping their germination intact	38 hours	162 hours	200 hours
Module 2: Carryout land preparation and management	**LU-1: :** Prepare the land as per required procedures including LASER land levelling and preparation of ridges **LU-2:** Sow the seeds either by direct seeding or	18hours	72hours	90hours

[1] Learning hours in training provider premises

[2] Training workshop, laboratory and on-the-job workplace

Aim: To prepare land for sowing of chilli seeds by following appropriate procedures	through nursery transplantation **LU-3:** Check, perform and maintain the irrigation of crop			
Module 3: Carryout weed management **Aim:** The aim of this module is to Apply the suitable weedicides and removal of weeds from the chilli field	**LU-1:**Select and apply suitable weedicides for chilli crop **LU2:** Identify weeds in the chilli field and apply procedures for their removal	20hours	85hours	105hours
Module 4: Carryout fertilizer management as per soil condition **Aim:** Selection and timely application of suitable fertilizers at the required level	**LU-1:**Determine the soil suitability for growing chillies **LU-2:** Select and apply suitable fertilizers on the basis of soil composition **LU-3:** Use organic fertilizers and fertilizer supplements	15hours	60hours	75hours
Module 5: Carryout pest management	**LU-1:** Recognize insect pests and diseases, and access their nature of damage at various chilli production stages **LU-2:** Determine the dosage and method of application	20hours	65hours	85hours

Aim: Monitoring the crop and control of insect pests and diseases	of pesticides			
Module 6: Carryout harvesting and post harvesting management **Aim:** Picking the ripened chilli and their subsequent drying and storage	**LU-1:** Recognize the picking stage and pick the ripened chillies properly **LU-2:** Pack and transport the freshly harvested chillies to the drying area **LU-3:** Undertake drying by following the suitable procedures **LU-4:** Pack the dried chillies in suitable material and transport to the godowns or market **LU-5:** Store chillies under proper conditions	45hours	200hours	245hours

3. CHILLI PRODUCTION CURRICULUM CONTENTS (TEACHING AND LEARNING GUIDE)

3.1 Module 1: Selection, treatment and storage of suitable seed

Objective of the Module: To select, treat and storesuitable seed for crop production

Duration: 200 hours **Theory:** 38 hours **Practice:** 162 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU-1: Select appropriate lots for producing seeds / or procure registered seeds	**Trainee will be able to:** • Identify different varieties of chillies • Recognize the sub types of chilli variety „Dandi cut" • Recognize hybrid varieties of chillies • Calculate the proportion of different sub types of Dandi cut chillies within a chilli lot • Distinguish between	• Chilli varieties and its sub types • Hybrid varieties • Healthy pods/seeds • Damaged pods/seeds • Shrivelled pods • Effect of good seed quality on productivity and occurrence of diseases • Procedure to	Total: 35hrs. Theory: 7hrs. Practical: 28hrs.	• Sampler (3) • Triple beam balance (2) • Stationery items e.g. pen, pencil, calculator etc. • Seed counter board • Aflatoxin meter (ELIZA reader) • Moisture meter **Consumables:**	Theory: Class room/farm field Practical: • Chilli warehouse/seed company dealers • Laboratory

	normal and damaged pods • Identify shrivelled chilli pods • Recognize the chillies that are likely to be fungal infested, discoloured, black spotted etc. • Calculate the proportion of normal pods in a lot • Calculate the proportion of damaged pods in a lot • Decide suitable chilli lots for seed production • Procure good chilli seeds that are disease free, pure variety etc. from authorized / reliable dealers. • Ascertain the quality of seed offered for procurement by undertaking physical observation/	determine the proportion of healthy seeds in the offered consignment • Selection of appropriate chilli field for seed production • Picking of healthy and diseased free pods for seed production. • Knowledge about germination test to ascertain the seed quality • Role of moisture in chilli quality • Role of aflatoxin in chilli supply chain • Permissible limits of aflatoxin in various countries and prevailing situation in Pakistan • Impact of mixing of damaged pods with healthier pods		• Varieties of chilli • Blotter paper • Petri dishes • Sample collection bags • Tetrazolium powder • ELISA test kits for detection of aflatoxins	

	germination test • Perform germination test on seeds offered for procurement • Perform moisture test or get the sample tested from laboratory • Perform aflatoxin test or get the chilli sample analyzed for aflatoxin from laboratory				
LU-2: Segregate the appropriate pods on the basis of their physical appearance	• Separate the healthier and damaged pods from selected chilli lots • Separate the various types of damages including discoloration, shrivelling, immaturities etc. • Recognize the extent of damage in the chilli pods e.g. minor, moderate and severe. • Test the damaged pods using	• Damaged pods including discoloured, immature, cracked, shrivelled, viscera bored, viscera opened, black spotted and fungal damaged. • Impact of appropriate/healthier/damaged pods on crop productivity • Extent of damage in chilli pods • Procedures to	Total:30hrs. Theory:6hrs. Practical:24hrs.	• Stationery items e.g. pen, pencil, calculator etc. • Photographs of normal and damaged chilli pods (available in research reports) • Triple beam balance (2) • Screens of suitable seeds and shaker	Theory: Class room/farm field Practical: • Chilli warehouse • Laboratory

	appropriate tests like visual analysis • Handle severely damaged chilli pods properly • Identify the suitable pods from selected lots for seed production • Segregate the sub types within Dandicut on the basis of physical characteristics • Separate shrivelled chilli pods • Separate infested chillies from the chilli lot	safely handle the damaged pods • Procedure to determine the proportion of various damaged pods in chilli lot • Procedure of segregating sub types of Dandi cut variety • Physically damaged and Infested chillies		**Consumables:** • Gloves • Mask • Bags	
LU-3: Extract the seeds from selected chilli pods and separate the undersized	• Select the site for extraction of seeds from chilli lots • Optimize the conditions of extraction site • Transfer the chilli lots to the extraction site • Perform cleaning and	• Knowledge about the appropriate procedures for seed extraction • The merits and demerits of various procedures for crushing the chilli pods for separation	Total:30hrs. Theory:6hrs. Practical:24hrs.	• Sieves • Chilli crusher like huge crusher etc. (03) • Magnet (03) **Consumables:** • Gloves	Theory: Class room/farm field Practical: • Chilli warehouse • Laboratory

seeds using appropriate procedure	other necessary arrangements at extraction site • Select suitable means of crushing of chilli pods • Perform mechanical crushing of chilli pods to obtain the seeds • Operate extraction equipments • Perform crushing of chillies manually • Recognize the undesirable materials in crushed chillies • Select suitable means of separating undesirable materials • Separate the undesirable materials from seeds such as inorganic materials, debris etc. • Recognize the under sized seeds • Select suitable means of separating undersized seeds from normal seeds • Screen the extracted seeds to remove the under size seeds	of seeds • Impact of under sized/damaged seeds on crop productivity • Knowledge about the optimum conditions for selecting the site of seed extraction • Impact of proper selection of extraction site • Maintenance of extraction equipments • Knowledge about the importance of good seed in chilli production • Importance of separation of undesirable materials from crushed chillies		• Mask • Bags • First aid box (03)	

	• Calculate the seed yield from the given chilli lot				
LU-4: Undertake seed treatment	• Select suitable means of treating the seeds • Select suitable fungicide and /or insecticides for treating the screened seeds • Obtain fungicide or insecticide from reliable source • Calculate the dosage of fungicide or insecticides for larger and smaller batches • Treat seeds of larger and smaller batches at recommended doses using appropriate application procedures • Handle the equipment used for seed treatment • Select the suitable means after seed dressing • Proper post-treatment handling of seeds such as drying of seeds	• Importance of seed treatment • Components of seed treatments and dressing • Impact of treated seeds on plant germination • Information about suitable fungicide/insecticide application for chilli seed treatment • Impact of application of inappropriate dosage of fungicide/ insecticide during seed treatment • Safety measures for the usage of sprayers • Cleanliness and calibration of equipment for seed treatment	Total:30hrs. Theory:4hrs. Practical: 26hrs.	• Sprayer for applying fungicides/insecticides (3) • Green net for seed drying • Insecticide mixing drums **Consumables:** • Fungicides/Insecticides • Gloves, mask and other precautionary items • First aid box (3)	Theory: Class room/farm field Practical: • Chilli warehouse

LU-5: Pack and tag the seeds	• Segregate the chilli seeds according to their date of entry, quality etc. • Select appropriate packing material • Select suitable means of packaging the chilli seeds • Pack the seeds properly • Design the label for chilli seeds to include date of entry, person involved etc. • label different chilli lots with identity, quantity, dates etc. • Register the details of chilli lots including date of procurement/entry/treatment, names of person involved in the process etc.	• Merits and demerits of various packaging material • Impact of appropriate packaging on storability of seeds • Storage of different varieties/ types in separate lots • Knowledge about the proper registration of different chilli lots • Tagging/labelling of seeds for identification	Total:35hrs. Theory: 7hrs. Practical:28hrs.	• Stationery items e.g. pen, pencil, Register etc. • Packaging material **Consumables:** • Tags • Bags	Theory: Class room/farm field Practical: • Chilli godowns/storage area
LU-6: Inspect and select the	• Examine the storage conditions • Select the suitable storage area	• Prerequisites of good storage management • Factors effecting	Total:40hrs. Theory:10hrs. Practical:30hrs.	• Stationery items e.g. pen, pencil, calculator etc.	Theory: Class room/farm field Practical:

site for storage of seeds and store the seeds under proper conditions keeping their germination intact	• Recognize the presence of pests in storage area • Identify the type of pests (like rodents, insects etc.) present in storage area • Calculate the extent of damage caused by pests • Select the suitable means of disinfestations of storage area • Calculate the dosage required for disinfestations of stores • Disinfest the store from any pre-existing infestation using contact insecticides and ensuring the hygienic conditions • Fumigation of seeds if and when required to ascertain insect infestation during storage • Inspect the site of chillies to ensure the proper storage • Maintain the storage	storage of seeds • Preventive, protective and corrective measures for control of insects and mites during storage • Identification of insects and mites that infests stored seeds • Impact of temperature, humidity, packing material etc. on seed viability during storage • Periodic Inspection of stores and produce • Importance of seed viability • Procedures to test seed viability • Criteria for acceptability of seeds on the basis of viability test • Determination of seed rate on the basis of		• Phosphine meter (02) • Knap sacks sprayer (03) • Humidity meter (05) • Thermometer (05) **Consumables:** • Phosphine tablets • Plastic sheet • Blotter paper • Petri dishes • Sample collection bags	• Chilli godowns/storage area

	conditions unfavourable for growth and development of fungi and insects ensuring proper ventilation • Perform the viability test prior to sowing using ready to use methods	germination test			

3.2 Module 2: Carryout land preparation and sowing of seeds

Objective of the Module: To prepare land for sowing of chilli seeds using appropriate procedures

Duration: 90 hours **Theory:** 18 hours **Practice:** 72 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU-1: Prepare the land as per required procedures including LASER and levelling and preparation of ridges	• Recognize different types of weeds and other unwanted materials in the field • Select suitable means for removal of unwanted material in fields • Manage weeds and other unwanted material using chemical and physical methods • Evaluate physical conditions to determine the type and texture of soil • Level land by using appropriate	• Ploughing to remove the debris of previous crop • Importance of removing weeds before sowing • Impact of weeds on productivity • Land levelling with and without laser leveller • Importance of levelling and merits and demerits of using laser leveller • Importance of ridge	Total:30hrs. Theory:6hrs. Practical:24hrs.	• Stationery items e.g. pen, pencil, etc. • LASER leveller (2) • Ridger(02) • Rotavator (02) • Tractor (02) • Plows like Mould board and cultivator etc. (02) **Consumables:** • Diesel • Mobil oil	Theory: Class room/farm field Practical: • Chilli growing field

	procedure • Preparation of uniform ridges at recommended distances • Calculate the size of the growing field for application of weedicide, fertilizer, pesticide etc.	formation in the field. • Importance of maintaining appropriate ridge-to-ridge and plant-to-plant distance keeping in view the variety, soil and water availability. • Impact of altering plant to plant and row to row distances • Land preparation by appropriate plough by use of machinery like tractor, cultivator, mouldboard etc.			
LU-2: Sow the seeds either by direct seeding or through nursery	• Select the method for the sowing of seeds (direct seeding or nursery	• Merits and demerits of direct seeding and nursery transplantation • Calculating the seed	Total:30 hrs. Theory:6 hrs. Practical:24	• Stationery items e.g. pen, pencil, Calculator etc.	Theory: Class room/farm field Practical: • Chilli growing

transplantation	transplantation) • Sow the seeds properly in case of direct seeding • Select the site for nursery • Prepare the nursery beds using appropriate distances • Cover the seed with appropriate material and procedure • Showering the nursery at suitable intervals e.g. 3-4 days • Maintenance of nursery plants for transplantation • Recognize the emergence stage • Recognize the stage for the saplings to be transplanted from the nursery to the	requirements sowing rates for nursery and for direct seeding • Differentiate between sowing through direct seeding or transplantation • Precautions during seed sowing • Development of nursery properly • Maintenance of the nursery plants • Method of transplantation of seedlings to the field • Precautions during transplantation	hrs.	• Water sprinkler (10) **Consumables:** • Chilli seeds • Pots • Straw	field

	growing field • Uproot unhealthy saplings from the nursery after a suitable period e.g. 2 weeks • Fungicidal treatment of nursery sapling before sowing in field. • Uproot and transplant the saplings from nursery in the main field				
LU-3: Check, perform and maintain the irrigation of crop	• Select the appropriate irrigation system on the basis of availability, water quality (e.g. pH, hardness, TDS etc.) • Draw water sample for pH, hardness and TDS testing • Perform pH test of water sample	• Different irrigation systems • Suitable irrigation system for chilli production • Check the performance of available irrigation system • Adaptation of recommended	Total:30 hrs. Theory:6 hrs. Practical:24 hrs.	• Stationery items e.g. pen, pencil, etc. • pH meter (03) • TDS meter (03) **Consumables:** • pH stripes	Theory: Class room/farm field Practical: • Chilli growing field

	• Determine hardness of water for irrigation • Determine the total dissolved solids (TDS) in water • Check the irrigation system • Irrigate the land by adapting suitable procedures • Managing irrigation intervals as per crop requirement • Managing the unsuitable water using appropriate procedures	procedures to irrigate the crop • Importance of proper irrigation system to chilli crop • Knowledge about irrigation management • Impact of suitable frequency of irrigation • Determination of the crop requirement for irrigation			

3.3 Module 3: Carryout weed management

Objective of the Module: Application of the suitable weedicides and removal of weeds from the chilli fields

Duration: 105 hours **Theory:** 20 hours **Practical:**85 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU-1: Select and apply suitable weedicides for chilli crop	• Select the suitable weedicides • Get the selected weedicide from registered certified/ reliable dealers • Apply the weedicide • Determine the proper timings of weedicide application at weed growth stage • Select appropriate sprayers • Select appropriate nozzles for	• Types of weed • Impact of weeds on the production of chillies • Types of weedicides • Knowledge regarding the mode of action of different weedicides • Recommended application procedures and dosage of weedicides • Types of sprayer • Importance of usage of different sprayers	Total:50hrs. Theory:10hrs. Practical:40hrs.	• Stationery items e.g. pen, pencil, etc. • Sprayer (3) • Nozzles (12) • Photographs of different weeds of chillies **Consumables:** • Weedicides • Precautionary kit for applying weedicides including mask, gloves etc. • First aid box	Theory: Class room/farm field Practical: • Chilli growing field

	sprayers • Calibrate the selected sprayers • Select appropriate methods of weedicide application	• Calibration of selected sprayers		(03)	
LU2: Identify weeds in the chilli field and apply procedures for their removal	• Recognize the weeds in the chilli field • Select the appropriate method to prevent weed • Apply the appropriate preventive measures for weeds • Select appropriate method of weed removal • Remove the weeds at appropriate	• Types of weeds commonly grown on the chilli field • Knowing the difference between the types of weeds • Merits of prevention and control of weeds in the field • Information about the different methods of weed control • Importance of weed removal at proper timings • Knowledge about Integrated Weed Management Practices (IWMP)	Total:55hrs. Theory:10hrs. Practical:45hrs.	• Stationery items e.g. pen, pencil, etc. • Photographs of common weeds • Sickles (10) • Pick axe (10) • Khurpee (10) **Consumables:** • weedicides • gloves • masks • First aid box (3)	Theory: Class room/farm field Practical: • Chilli growing field

	timings • Remove weeds manually • Remove weeds physically • Remove weeds chemically				

3.4 Module 4: Carryout fertilizer management as per soil condition

Objective of the Module: Selection and application of suitable fertilizers at right time and at required level

Duration: 75 hours **Theory:** 15 hours **Practice:** 60 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU-1: Determine the soil suitability for growing chillies	• Use suitable equipment for soil sampling • Draw the representative soil samples • Perform randomized sampling of soil • Label the soil sample with all required information e.g. date of sampling, sampler name and initials etc. • Select the suitable and reliable	• Type of soils and their suitability for chilli production • Knowledge about drawing the soil samples • Storage of soil samples to conserve moisture and other factors • Importance of randomized soil sampling • Equipment requirement and their utility for sampling • Basic soil requirements for production of chillies • Important components of a soil analysis report • Interpretation of soil	Total:25hrs. Theory:5hrs. Practical:20hrs.	• Stationery items e.g. pen, pencil, Register etc. • Soil samplers **Consumables:** • Soil sample collection bags	Theory: Class room/farm field Practical: • Chilli growing field • Visit of soil testing laboratory

	laboratory for soil testing • Get soil tested from a laboratory • Determine the soil fertility by examining the soil test report • Recognize typical soil types for determining the suitability for chilli production	analysis report			
LU-2: Select and apply suitable fertilizers on the basis of soil composition	• Select appropriate fertilizers for the soil on the basis of soil and crop requirement • Obtain selected fertilizers from certified/ reliable dealers • Apply the required dosage of fertilizer using appropriate procedures • Identify the optimum	• Knowing the different properties of soil • Soil deficiencies and their management • Interpretation of soil testing reports to determine soil fertility • Importance of fertilizers • Role of fertilizers in crop production • Types of fertilizers and their utility • Calculating the fertilizer dose requirement in the light	Total:20hrs. Theory:4hrs. Practical:16hrs.	• Stationery items e.g. pen, pencil, calculator etc. **Consumables:** • Fertilizers • Gloves	Theory: Class room/farm field Practical: • Chilli growing field •

	timings of fertilizer application for best results • Calculate the fertilizer dosage • Determine the mode of action of selected fertilizer • Interpret the soil test report	of soil analysis report • Method of applying fertilizer at the time of soil preparation • Reasons to apply fertilizers • Proper timing of fertilizers application • Impact of timings of fertilizer application on crop productivity • Impact of fertilizer dose on crop productivity			
LU-3: Use organic fertilizers and fertilizer supplements	• Select appropriate organic fertilizers such as cattle manure, cereal and legume stovers and wood land litter on the basis of soil and crop requirement, cost and availability etc. • Compost the organic fertilizer by utilizing various materials such as straw, tree leaves, farmyard manure etc.	• Importance of organic fertilizers • Difference between organic and chemical fertilizers • Proper application of organic fertilizers • Difference between nutrients and minerals • Type of nutrients and minerals essential for	Total:30hrs. Theory:6hrs. Practical:24hrs.	• Stationery items e.g. pen, pencil, etc. • Pick axe (10) • Trolley (10) **Consumables:** • Organic and inorganic fertilizers • Fertilizer supplements • Farmyard	Theory: Class room/farm field Practical: • Chilli growing field

	• Use of organic fertilizer as per requirement by adopting appropriate procedures like board casting, banding and spot application (or side-dressing) • Apply nutrients /minerals for supplementing fertilizers • Use organic fertilizer at proper time • Calculate the ratio of different nutrients for fertilizer supplementation	soil • Importance of nutrients and minerals in improving the soil fertility • Procedures to apply nutrients and minerals. • Determinating the soil requirements of nutrients and minerals • Importance of application of organic fertilizer at proper timing • Impact of fertilizer supplementation		manure	

3.5 Module 5: Carryout pest management

Objective of the Module: Monitoring the crop and control of insect pests

Duration: 85 hours **Theory:** 20 hours **Practical:** 65 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU-1: Recognize insect pests and diseases, and access their nature of damage at various chilli production stages	• Identify the insect pests of chillies and diseases • Relate insect pests and diseases with climatic factors • Calculate losses due to insect attack • Determine the economic threshold level for different insect pests • Recognize the insect species and diseases that attack at particular stages of crop production	• Knowledge about insect pests and diseases • Insect pests and their relationship with climatic factors • Identification of various pest species • Losses due to insect pest attack • Insect pests and diseases of chillies and their timings of occurrence • Role of insects as a vectors of bacterial, viral and fungal diseases • Developmental stages of	Total:45hrs. Theory:10hrs. Practical:35hrs.	• Stationery items e.g. pen, pencil, calculator etc. • Photographs of various insect and fungi • Magnifying glass (5) **Consumables:** • Insecticides • Fungicides • Masks • Gloves	Theory: Class room/farm field Practical: • Chilli growing field

	• Monitor the crop for determining the level of insect activity • Collect samples for insect identification and their comparative occurrence • Recognize mouldy pods • Separate mouldy pods • Select the appropriate fungicide according to mould attack • Identify different growth stages of insect pests	insect pests • Feeding sites of insects • Sampling for detection of insects and their relative abundance • Determining economic threshold levels (ETL) for different insect pests • Determining the timing of pesticide application keeping in view their ETL		• First aid box (3)	
LU-2: Determine the dosage and method of application of pesticides	• Differentiating the types of insecticides/fungicides • Selecting appropriate insecticides/fungicides	• Types of insecticides and their use • Mode of action of different types of pesticides • Differentiation between generic and branded pesticides	Total:40hrs. Theory:10hrs. Practical:30hrs.	• Stationery items e.g. pen, pencil, calculator etc. • Sprayers (3) • Nozzles (12)	Theory: Class room/farm field Practical: • Chilli growing

	• Obtaining insecticides/fungicides from reliable source • Prepare the solution insecticides/fungicides before applying to the crop • Use the knap sack sprayer and its adjustment for crop spraying • Determine the frequency and interval of pesticide application, keeping in view infestation levels • Apply pesticide using safety measures • Select the appropriate sprayer • Calibrate the sprayer • Select proper nozzle of sprayer • Inspect the crop at different stages of production for insect pest and diseases attack	• Concept of active ingredient in calculating the dose • Preparation of suspension for crop spraying • Impact of pH on insecticidal activity • Knowledge regarding the knap sack sprayer • Importance of the usage of knap sack sprayer • Adjustments in knap sack sprayer for its optimum use • Determining the need of pesticide applications • Timings and frequency of pesticide application • Procedures of applying pesticides • Principles of the safe usage of		• Magnifying glass (5) **Consumables:** • Insecticides • Fungicides • Masks • Gloves • First aid box (3)	field

		pesticides • Advantages of applying precautionary measures for operators			

3.6 Module 6: Carryout harvesting and post harvesting management

Objective of the Module: Picking the ripened chilli and their subsequent drying and storage

Duration: 245 hours **Theory:** 45 hours **Practical:** 200 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU-1: Recognize the picking stage and pick the ripened chillies properly	• Identify picking stages on the basis of ripening of pods • Decide on the picking time • Determine the number of pickings required • Differentiate between mature and immature pods • Distinguish between damaged and normal pods • Understand the different types of damages to chilli	• The importance of picking in determining chilli quality • The number of possible pickings • Importance of suitable timing of picking • Difference between ripened, damaged and immature pods • Procedures to handle immature and damaged chillies • Types of damages in chillies • Impact of damaged pods on the quality of chilli lot • Procedures for picking without causing damage to pods • The impact of improper picking	Total:40hrs. Theory:8hrs. Practical:32hrs.	**Consumables:** • Bags • Chilli collecting baskets • First aid box (03)	Theory: Class room/farm field Practical: • Chilli growing field

	pods • Manage immature and damaged chillies • Pick chillies properly • Adopt precautionary measures during picking • Handle the mature chillies while picking from the plant • Recognize the damaged pods on the chilli plant • Handle the damaged chillies separately	on the quality of chilli • Impact of handling damaged chillies separately			
LU-2: Pack and transport the chillies to the drying area	• Select suitable containers for carrying fresh/mature chillies like wooden/plastic	• Impact of suitable containers for collection of chillies • Suitable procedure of chilli bagging	Total:40hrs. Theory:8hrs. Practical:32hrs.	• Stationery items e.g. pen, pencil, calculator etc. • Donkey cart (02) **Consumables:**	Theory: Class room/farm field Practical:

	baskets, cotton/jute bags • Calculate the cost effectiveness of freshly harvested chilli carrier • Determine the impact of carrier on damaging of chilli • Pack the chillies properly to minimize damages during transportation • Select suitable means of transport like self carry, donkey cart etc. to reduce damages on the basis of distance, cost etc. • Calculate the cost effectiveness of different types of transport for freshly harvested	• Appropriate means to transport chillies to the drying area • Impact of improper transport on the quality and physical injury of chillies • Calculations to determine the cost effectiveness of freshly harvested chilli carriers and its transportation to drying areas • Type of damages likely to be occurred during transportation • Information about weather forecasting at time of transportation • Handling of fresh chillies in unusual weather		• Bags • Containers/baskets	• Chilli growing field

	chillies • Determine the impact of transport on inducing any damage to chilli pods • Transport chillies from farm to the drying area • Manage the freshly picked chillies during unusual weather e.g. rains				
LU-3: Undertake drying by following the suitable procedures	• Identify the suitable areas for the drying of chillies • Identify the suitable drying surface that may help the removal of moisture and maintain the hygiene of produce	• Introduction to drying surfaces • Effects of different drying surfaces on chilli quality • Identification and best utilization of drying surface • Impact of optimization the drying practices • Good Drying Practices (GDP) • Effect of improper drying on	Total:90 hrs. Theory:13hrs. Practical:77hrs.	• Stationery items e.g. pen, pencil, etc. • Tool used for turning of chilli pods during drying • Moisture meter for chillies (10)	Theory: Class room/farm field Practical: • Chilli growing field

	• Prepare a suitable drying surface or use of other means of drying • Identify the surface which is unhygienic for drying purpose • Dry chillies on green net or other sheets • Covering the chillies being dried with suitable material to prevent dampness from dew • Distinguish between saline and non-saline surfaces • Dry chillies upto the suitable moisture level following the Good Drying Practices (GDP). This may	chilli quality • Knowing the completion stage of drying • Relationship of environmental factors with drying period • Importance of sorting the damaged pods • Importance of handling of damaged pods separately		**Consumables:** • Dehydrants like Victoria oil etc. • Bags • Sheets to cover chilli pods during night • Green net	

	include procedures to minimize human or animal interference at drying field. • Ensure single layer of produce during drying etc. • Handle chillies at night during drying process. • Recognize the undesirable chillies such as discoloured, cracked, viscera open, viscera bored and black spotted pods • Separate the undesirable chillies from the drying field • Determine moisture content in chillies during and after drying				

	• Maintain hygienic conditions during drying • Recognize the completion of drying period on the basis of moisture, colour etc.				
LU-4: Pack the dried chillies in suitable material and transport to the godowns or market	• Select suitable packing material for dried chillies like jute /cotton bags etc. that may help to prevent any possible damage to pods during transportation • Pack chillies using appropriate procedures to avoid over filling, damaging etc. • Transport chilli bags from drying	• Suitable packing materials for chillies • Good practices for packing of chilli pods • Importance of packaging in maintaining chilli quality • Proper transportation of chillies from drying field to godowns • Calculation of cost effectiveness of dried chilli carrier and its transportation • Impact of improper transportation on prevention of damage to chilli	Total:30 hrs. Theory:8 hrs. Practical:22hrs.	• Stationery items e.g. pen, pencil, calculators etc. • Packaging material • Donkey cart (02) • Containers **Consumables:** • Cotton/jute bags	Theory: Class room/farm field Practical: • Chilli growing field

	field to storage godowns and/or markets with precautionary measures to avoid overloading, delay etc. • Calculate the cost effectiveness of dried chilli carrier • Determine the impact of carrier on physical injury to chilli • Pack the chillies properly to minimize damages during transportation • Select suitable means of transport like self carry, donkey cart etc. to reduce damages on the basis of distance, cost etc.				

	• Calculate the cost effectiveness of transport • Determine the impact of transport on physical injury to chilli pods • Transport chillies from drying area to godown/markets				
LU-5: Store chillies under proper conditions	• Inspect the storage site to check its suitability for the storage of dried chillies • Check the site for insect pests • Identify insect pest species at storage site • Identify type of	• Impact of storage conditions on chilli quality • Inspection and selection of site for storage of chillies • Packing and tagging the chilli lots • Storage of chillies under proper conditions • Management of periodic inspection of stores • Importance of periodic inspection of stores to ensure chilli quality • Influence of humidity and	Total:45hrs. Theory:8hrs. Practical:37hrs.	• Stationery items e.g. pen, pencil, etc. • Phosphine meter (10) • Humidity meter (10) • Thermometer (10) • Inch tapes (3) **Consumables:** • Phosphine tablets	Theory: Class room/farm field Practical: • Chilli stores/ gowdowns

	rodents presence at storage site • Inspect the storage site for proper ventilation • Check that the storage area is suitable for fumigation • Ensure acceptable levels of humidity and temperature in store • Measure the total storage area • Apply suitable contact insecticide to disinfect/disinfest the storage site if required • Pack and tag the chilli lots to	temperature on storage of chillies • Selection of pesticide according to timing and dosage		• Mask • Gloves • First aid box (03) • Covering sheet	

	include the details like date of entry, persons involved etc. • Store chillies under proper conditions to retain chilli quality and wholesomeness and to keep them free from insects, rodents and microbial infestation etc. • Undertake the periodic inspection of stores to ensure maintenance of chilli quality				

4. ASSESSMENT GUIDANCE

Good assessment practices should be used for sessional and final assessments. Such practices by vocational training providers during sessional and final assessments will form the basis of qualifying the trainees.

4.1 Differences between sessional and final assessment

Sessional assessment shall be on an all-time basis. Its purpose is to provide feedback on what students are learning:

- to the student: will identify achievement and areas for further teaching and its level.
- to the teacher: will evaluate the effectiveness of teaching, and guide to determine the future plan.

Assessors need to devise sessional assessments for both theoretical and practical work. Guidance is provided in the assessment strategy

Final assessment is the assessment, usually on completion of a course or module, which says if the student has "passed". It is - or should be - undertaken with reference to all the objectives or outcomes of the course, and is

usually fairly formal. Considerations of security - ensuring that the student who gets the credit is the person who did the work - assume considerable importance in final assessment.

4.2 Methods of assessment

For lessons with a high quantity of theory, written or oral tests related to learning outcomes and/ or learning content can be conducted. For work place lessons, assessment will focus on the quality of planning and executing the related process along with the quality of the product and/or evaluation of the process.

Methods will include direct assessment, as the most desirable form of assessment. For this, evidence shall be obtained by directly observing the student's performance.

Examples for direct assessment of a chilli producer will include:

- Work performances, for example picking of mature red chillies without damaging and their proper packing and transportation to the drying field.
- Demonstrations, for example the treatment of chilli seeds and testing of viability of seeds.
- Direct questioning, where the assessor will ask the student how to manage weeds in the field or spray pesticides or apply fertilizers etc.

- Paper-based tests, such as multiple choice or short answer questions on farm handling, hygienic and safety issues, or working with others.

Indirect assessment shall be used where the performance could not be watched and evidence is gained indirectly.

Examples for indirect assessment of a chilli producer will include:

- Proper drying of chillies: dried upto the extent that will retain chilli"s quality and will be safe against microbial attack during subsequent handling.
- Storage of chillies, the methods adopted to store chillies.

Indirect assessment should only be a second choice (In some cases, it may not even be guaranteed that the work products were produced by the person being assessed).

4.3 Principles of assessment

All assessments should be valid, reliable, fair and flexible:

Fairness means that there should be no advantages or disadvantages for any assessed person. For example, it should not happen that one student gets prior information about the type of work performance that will be assessed, while another candidate does not get any prior information.

Validity means that a valid assessment assesses what it claims to assess. For example, if the ability to pick the chillies from field is to be assessed and certified, the assessment should involve performance criteria thatare directly related to chilli crop and field. An interview about picking or harvesting of different crops would not meet the performance criteria.

Reliability means that the assessment is consistent and reproducible. For example, if the work performance of preparing a drying surface and methods adopted to dry the chillies has been assessed, another assessor (e.g. the future employer) should be able to see the same work performance and witness the same level of achievement.

Flexibility means that the assessor has to be flexible concerning the assessment approach. For example, if there is a power failure during the assessment, the assessor should modify the arrangements to accommodate the students' needs.

4.4 Assessment strategy for the Chilli production Curriculum

This curriculum consists of 6 modules:

- Module 1: Selection, treatment and storage of suitable seed
- Module 2: Carryout land preparation and management
- Module 3: Carryout weed management
- Module 4: Carryout fertilizer management as per soil condition
- Module 5: Carryout pest management
- Module 6: Carryout harvesting and post harvesting management

4.5 Suggestion for sessional assessment

The sessional assessment for all modules shall be in two parts: theoretical assessment and practical assessment. The sessional marks shall contribute to the final qualification.

Theoretical assessment for all learning modules must consist of a written paper lasting at least one hour per module. This can be a combination of multiple choice and short answer questions.

For practical assessment, all procedures and methods for the modules must be assessed on a sessional basis. Guidance is provided under the title Planning for assessment.

4.6 Suggestion for final assessment

Final assessment shall be in two parts: theoretical assessment and practical assessment. The final assessment marks shall contribute to the final qualification. The final theoretical assessment shall consist of multiple choice and short answer questions, covering all modules. For practical assessment, the growing field, storage site, drying areas shall be selected to assess the competencies of student expected to be gained after this training course.

It is also proposed that the assessment may take place in such a way that covers each of the modules. Time and markings may be distributed according to the importance of module that is reflected from the time invested during teaching. The distribution of time and markings for assessment are given below:

	Distribution of time and markings for assessment		
	Total	**Out of total hrs. / markings**	**Practical**
MODULE 1	25%	5%	20%
MODULE 2	11%	2%	9%
MODULE 3	13%	3%	10%
MODULE 4	9%	2%	7%
MODULE 5	11%	2%	9%
MODULE 6	31%	6%	25%
Total	100%	20%	80%

Few examples that examiner may use for the assessment are given below:

	PRACTICAL	THEORY
MODULE 1		
LU-1: Select appropriate lots for producing seeds / or procure registered seeds	**Trainee should be able to:** • Identify different varieties of chillies including sub types of chilli variety „Dandi cut‟ and hybrid varieties of chillies • Calculate the proportion of different sub types of Dandi cut chillies; normal pods; damaged pods within a given chilli sample • Distinguish between normal and damaged pods • Identify shrivelled chilli pods; fungal infested, physically damaged, discoloured etc. • Perform germination test on chilli seed sample • Determine moisture content and aflatoxin level in chilli sample	**Trainee will be asked for:** • Chilli varieties and their sub types • Hybrid varieties • Healthy pods/seeds • Damaged pods/seeds • Shrivelled pods • Effect of good seed quality on productivity and occurrence of diseases • Knowledge about germination test to ascertain the seed quality • Role of moisture in chilli quality • Role of aflatoxin in chilli supply chain • Permissible limits of aflatoxin in various countries and prevailing situation in Pakistan • Impact of mixing of damaged pods with healthier pods
LU-2: Segregate the appropriate pods on the	• Identify various types of damages (including discoloration, shrivelling, immaturation etc.)	• Damaged pods including discoloured, immature, cracked, shrivelled, viscera bored, viscera opened, black spotted and fungal

basis of their physical appearance	• Recognize the extent of damage in the chilli pods e.g. minor, moderate and severe. • Identify the suitable pods for seed production • Segregate the sub types within Dandi cut based on physical characteristics • Separate shrivelled chilli pods • Separate infested chillies from the chilli lot	damaged. • Understand the impact of appropriate/healthier/damaged pods on crop productivity • What type of damaged pods are most harmful and how to handle severely damaged chilli pods
LU-3: Extract the seeds from selected chilli pods and separate the undersized seeds using appropriate procedure	• Perform cleaning and other necessary arrangements at extraction site • Perform mechanical crushing of chilli pods to obtain the seeds • Operate crushing equipment • Perform crushing of chillies manually • Recognize the undesirable materials in crushed chillies • Separate the undesirable materials from seeds such as inorganic materials, debris etc. • Recognize the under sized seeds • Screen the extracted seeds to remove the under size seeds • Calculate the seed yield from the given chilli sample	• The merits and demerits of various procedures for crushing the chilli pods for separation of seeds • Impact of under sized/damaged seeds on crop productivity • Procedures of seed extraction from chilli lot. • Optimum conditions at extraction site • Suitable means of separating undesirable materials • Suitable means of separating undersized seeds from normal seeds
LU-4: Undertake seed treatment	• Select suitable fungicide and /or insecticide for treating the screened seeds • Handle the equipments required for seed treatment	• Importance of seed treatment • Components of seed treatments and dressing • Impact of treated seeds on plant germination • Suitable means of treating the seeds

	• Perform seed treatment • Handle the seeds after treatment such as drying of seeds	• Calculate the dosage of fungicide or insecticide for larger and smaller batches • Procedures to treat seeds of larger and smaller batches at recommended doses using appropriate application procedures
LU-5: Pack and tag the seeds	• Select appropriate packing material • Pack the seeds properly • Design the label for chilli seeds to include date of entry, person involved etc. • Label different chilli lots mentioning identity, quantity, dates etc. • Register the details of chilli lot including date of procurement/entry/treatment, names of person involved in the process etc.	• Merits and demerits of various packing material • Use of appropriate packing for seed storage • Storage of different varieties/ types in separate lots • Tagging/labelling of seeds for identification • Features of segregating the chilli lots according to their date of entry, quality etc. • Suitable means of packaging the chilli seeds
LU-6: Inspect and select the site for storage of seeds and store the seeds under proper conditions keeping their germination intact	• Recognize the presence of pests in storage area • Identify the type of pests (like rodents, insects etc.) present in storage area • Determine the extent of damage caused by pests • Select the suitable means of disinfestations of storage area • Calculate the dosage requirement of pesticide disinfestations of pests. • Disinfest the store from any pre-existing infestation using contact insecticides and ensuring the hygienic conditions	• Pre-requisites of good storage management • Factors effecting storage of seeds • Preventive, protective and corrective measures for the control of insects and mites during storage • Identification of insects and mites that infests stored seeds • Impact of temperature, humidity, packing material etc. on seed viability during storage • Periodic Inspection of stores and produce • Importance of seed viability • Procedures to test seed viability • Criteria for acceptability of seeds on the basis

	• Perform the viability test prior to sowing using ready to use methods	of viability test • Determine the seed rate on the basis of germination test
MODULE 2		
LU-1: Prepare the land as per required procedures including LASER land levelling and preparation of ridges	• Recognize weeds and other unwanted materials in the field • Select suitable means for the removal of unwanted material • Evaluate physical conditions to determine texture and type of soil • Prepare the land by appropriate ploughs and machinery like tractor, cultivator, mouldboard etc. • Operate tractor and other machinery • Level land by using appropriate procedure • Prepare the ridges uniformly at recommended distances • Calculate the size of growing field for application of weedicide, fertilizer, pesticide etc.	• Rotavation to remove the debris of previous crop • Importance of removing debris and weeds before sowing • Land levelling with and without laser leveller • Importance of levelling and merits and demerits of using laser leveller • Importance of ridge formation • The ridge-to-ridge and plant-to-plant distances keeping in view the soil type and variety • Impact of altering plant to plant and row to row distances • Procedures to manage debris, weeds and other unwanted materials
LU-2: Sow the seeds either by direct seeding or through nursery transplantation	• Sow the seeds properly in case of direct seeding • Prepare the nursery beds with appropriate measurement and distances • Broadcast the seeds • Recognize the emergence stage	• Merits and demerits of direct seeding and nursery transplantation • Calculating the seed sowing rates for nursery and direct seeding • Differentiate between sowing through broadcasting

	• Recognize the stage of saplings to be transplanted from nursery to the growing field • Uproot and transplant the saplings from nursery to the main field	and transplantation • Precautions to be undertaken during seed sowing • Developing a disease-free nursery • Maintenance of the nursery plants • Procedure of transplantation of seedlings to the field • Precautions required during transplantation
LU-3: Check, perform and maintain the irrigation of crop	• Draw water sample for determining the pH, hardness and TDS testing • Perform pH test on water sample or get it analyzed. • Determine hardness of water or get it analyzed. • Determine the total dissolved solids (TDS) in water sample or get it analyzed • Irrigate the land by adopting suitable procedures • Manage the unsuitable water	• Different irrigation systems • Selection of suitable irrigation system for chilli production • Check the performance of available irrigation system procedure • Adaptation of recommended procedures to irrigate the crop • Importance of proper irrigation system to chilli crop • Knowledge about the irrigation management • Impact of suitable frequency of irrigation • Determination the crop requirements for irrigation • Importance of water quality and its effectiveness on (e.g. pH, hardness, TDS etc.)

MODULE 3		
LU-1: Select and apply suitable weedicides for chilli crop	• Select the suitable weedicide • Select appropriate sprayers • Select appropriate nozzles for sprayers • Apply the weedicide at appropriate dosage • Calibrate the selected sprayers • Select appropriate method of weedicide application	• Type of weeds • Damage induced due to weeds to the crop • Types of weedicides • Recommended application procedures and dosage of weedicides • Importance of sprayers • Types of sprayer • Obtain the selected weedicide from certified/ reliable dealers
LU2: Identify weeds in the chilli field and apply procedures for their removal	• Recognize the weeds in chilli field • Select appropriate method to prevent weeds • Apply the appropriate preventive measure for weeds • Select appropriate method of weed removal • Remove the weeds at proper timings • Remove weeds manually • Remove weeds mechanically • Remove weeds chemically	• Types of weeds commonly grown in chilli field • Knowing the difference between different weeds • Merits of prevention and control of weeds in the field
MODULE 4		
LU-1: Determine the soil suitability for growing chillies	• Use appropriate equipment for soil sampling	• Type of soils and their suitability for chilli production

	• Draw the representative soil samples • Perform randomized sampling of soil • Label the soil sample with all required information e.g. date of sampling, sampler"s name and initials etc. • Determine the soil fertility by evaluating soil test report • Recognize typical soil types suitable for chilli production	• Knowledge about drawing the soil samples • Storage of soil samples to conserve moisture and other factors • Importance of randomized soil sampling • Equipment requirement and their use for sampling • Basic soil requirements for growing chilli • Important components of a soil analysis report • Interpretation of soil analysis report • Selection of laboratory for soil testing
LU-2: Select and apply suitable fertilizers on the basis of soil composition	• Interpret the soil test report • Select appropriate fertilizers for the soil on the basis of soil and crop requirements • Apply the required dosage of fertilizer using suitable procedure • Identify the optimum timings of fertilizer application for best results • Calculate the fertilizer dosage • Determine the mode of action of selected fertilizer	• Knowing the different properties of soil • Soil deficiencies and their management • Interpretation of soil testing reports to determine soil fertility and it"s needs • Importance of fertilizers • Role of fertilizers in crop production • Types of fertilizers and their utility • Calculating the fertilizer dose in the light of soil analysis report • Method of applying fertilizer at the time of soil preparation • Reasons to apply fertilizers • Proper timing of fertilizers application • Impact of fertilizer application timings on crop productivity

		• Impact of fertilizer dose on crop productivity
LU-3: Use organic fertilizers and fertilizer supplements	• Select appropriate organic fertilizers such as cattle manure, cereal and legume stovers and wood land litter on the basis of soil and crop requirement, cost and source etc. • Compose the organic fertilizer by using various materials such as straw, tree leaves, farmyard manure etc. • Use of organic fertilizer as per requirement by adopting appropriate procedures of application like board casting, banding and spot application (or side-dressing) • Apply nutrients /minerals for supplementing fertilizers • Calculate the ratio of different nutrients for fertilizer supplementation	• Importance of organic fertilizers • Difference between organic and inorganic fertilizers • Proper application of organic fertilizers • Difference between nutrients and minerals • Type of nutrients and minerals that are essential for soil • Importance of nutrients and minerals in improving the soil fertility • Procedures to apply nutrients and minerals. • Determination the soil requirements of nutrients and minerals • Timings of using organic fertilizer at proper time
MODULE 5		
LU-1: Recognize insect pests and diseases, and access their nature of damage at various chilli production stages	• Identify the insect pests of chillies • Calculate the losses due to insect attack • Recognize the insect species that attacks at particular stage of crop production • Monitor the crop for determining the level of insect activity • Collect samples for insect identification and their comparative occurrence	• Knowledge about the insect pests • Insect pests and their relationship with climatic factors • Identification of various pest species • Losses due to insect pest attack • Insect pests of chillies and their timings of occurrence • Role of insects as a vector of bacterial, viral and

	• Recognize the mouldy pods • Select the appropriate insecticide/fungicide according to requirement • Identify different growth stages of insect pests	fungal diseases • Developmental stages of insect pests • Feeding sites of insects • Sampling for detection of insects and their relative abundance • Determining economic threshold levels(ETL) for different insect pests • Determining the timing of pesticide application keeping in view their ETL
LU-2: Determine the dosage and method of application of insecticides	• Differentiate the types of pesticides • Select appropriate pesticides • Prepare pesticides before their application to the crop • Use the knap sack sprayer and its adjustment for crop spraying • Apply pesticide using safety measures • Select the appropriate sprayer • Calibrate the sprayer • Select proper nozzle of sprayer	• Types of insecticides and their use • Mode of action of different types of pesticides • Differentiation between generic and branded pesticides • Concept of active ingredient in calculating the dose • Preparation of suspension for crop spraying • Impact of pH on insecticidal activity • Knowledge about the knap sack sprayer • Importance of usage of knap sack sprayer • Adjustments in knap sack sprayer for its optimum use • Determining the need of pesticide applications • Timings and frequency of pesticide application • Procedures of applying pesticides • Principles of safe use of pesticides • Advantages of applying the precautionary measures for operators

MODULE 6		
LU-1: Recognize the picking stage and pick the ripened chillies properly	• Differentiate between mature and immature pods • Distinguish between damaged and normal pods • Understand the different types of damages to chilli pods • Manage immature and damaged chillies • Pick chillies properly • Adopt precautionary measures during picking • Handling of the mature chillies during and after picking • Recognize the damaged pods on the chilli plant • Keep the damaged chillies separately	• The importance of picking in determining chilli quality • Number of possible pickings • Importance of the suitable timings of picking • Difference between ripened, damaged and immature pods • Methods of handling immature and damaged chillies separately • Types of damages to chilli pods • Impact of damaged pods on the overall quality of chilli lot • Procedures for picking without causing damage • The impact of improper picking on the ultimate quality of produce • Impact of handling damaged chillies separately
LU-2: Pack and transport the chillies to the drying area	• Select suitable carrier of fresh/mature chillies like wooden/plastic baskets, cotton/jute bags • Bag the chillies properly to minimize damages during transportation • Transport chillies from field to the drying area	• Impact of suitable containers for the collection of chillies • Suitable procedure of chilli bagging • Using appropriate procedures to transport chillies to the drying area • Impact of improper transport on the quality of chillies

LU-3: Undertake drying by following the suitable procedures	• Identify the suitable area for drying • Identify the suitable drying yard to facilitate the removal of moisture and maintain the hygiene of produce • Prepare a suitable drying surface or use of other means of drying • Identify the surface which is unhygienic for drying purpose • Dry chillies on green net or other sheets • Distinguish between saline and non-saline surfaces • Dry chillies upto the suitable moisture level by following Good Drying Practices (GDP). This may include procedures to minimize human/animal interference in drying field. • Ensure spreading a single layer of produce at the time of drying etc. • Recognize the undesirable chillies such as discoloured, cracked, viscera open, viscera bored and black spotted pods • Determine moisture content in chillies during and after drying	• Introduction to drying surfaces • Effects of different drying surfaces on chilli quality • Identification and best utilization of drying surface • Impact of optimizing the drying practices • Good Drying Practices (GDP) • Effect of improper drying on chilli quality • Knowing the completion stage of drying • Relationship of environmental factors with drying period • Importance of sorting the damaged pods • Importance of keeping the damaged pods separately

LU-4: Pack the dried chillies in suitable material and transport to the godowns or market	• Select suitable packing material for dried chillies like jute /cotton bags etc. that may help to overcome the damage of dried pods during transport • Pack chillies using appropriate procedures to avoid over filling, damage etc. • Transport chilli bags from drying field to storage godowns and/or markets with precautionary measures to avoid overloading, delay etc. • Transport chillies from growing field to the drying area	• Suitable packing materials for chillies • What are the good practices for packing of chilli pods • Importance of packaging in maintaining the chilli quality • Proper transportation of chillies from drying field to godowns
LU-5: Store chillies under proper conditions	• Inspect the storage site to check its suitability for the storage of chillies • Check the site for pests • Identify insect species at storage site • Identify type of rodents present at storage site • Check that the storage area is suitable for fumigation • Check the site for maintenance of humidity and temperature • Measure the total storage area	• Impact of storage conditions on chilli quality • Inspection and selection of the site for storage of chillies • Packing and tagging the chilli lots • Storage of chillies under proper conditions • Management of periodic inspection of stores

	• Apply suitable contact insecticide to disinfest the storage site if required • Pack and tag the chilli lots to include the details like date of entry, persons involved etc. • Store chillies under proper conditions to retain chilli quality and wholesomeness for example free of insects, rodents and microbial infestation etc.	

4.7 Structure of the assessment team

The number of assessors must meet the needs of the students and the training provider. For example, where **two assessors** are conducting the assessment, there must be a maximum of **five students per assessor.** In this example, a group of 20 students shall therefore require assessments to be carried out over a four-day period.

4.8 Planning for assessment

Sessional assessment: assessors need to plan in advance how they will conduct sessional assessments for each module. The tables on the following pages are for assessors to use to insert how many hours of theoretical and practical assessment will be conducted and what the scheduled dates are.

Final assessment: Training providers need to decide ways to combine modules into a cohesive two-day final assessment programme for each group of five students. Training providers must agree the settings for practical assessments in advance.

4.9 Planning aid for sessional assessment

Module 1: Selection, treatment and storage of suitable seed		
Learning Units	**Assessment methodology**	**Scheduled dates**
LU-1: Select appropriate lots for producing seeds / or procure registered seeds **LU-2:** Segregate the appropriate pods on the basis of their physical appearance **LU-3:** Extract the seeds from selected chilli pods and separate the undersized seeds using appropriate procedure **LU-4:** Undertake seed treatment **LU-5:** Pack and tag the seeds **LU-6:** Inspect and select the site for storage of seeds and store the seeds under proper conditions keeping their germination intact		

Module 2: Carryout land preparation and management		
Learning Units	**Assessment Methodology**	**Scheduled dates**
LU-1: Prepare the land as per required procedures including laser levelling of the cultivation land and preparation of ridges **LU-2:** Sow the seeds either by direct seeding or through nursery transplantation **LU-3:** Check, perform and maintain the irrigation of crop		

Module 3: Carryout weed management		
Learning Units	**Assessment methodology**	**Scheduled dates**
LU-1: Select and apply suitable weedicides for chilli crop **LU2:**Identify weeds in the chilli field and procedures to remove them appropriately		

Module 4: Carryout fertilizer management as per soil condition		
Learning Units	**Assessment methodology**	**Scheduled dates**
LU-1: Determine the soil suitability for growing chillies **LU-2:** Select and apply suitable fertilizers on the basis of soil composition **LU-3:** Use organic fertilizers and fertilizer supplements		

Module 5: Carryout pest management		
Learning Units	**Assessment methodology**	**Scheduled dates**
LU-1: Recognize insect pests and diseases, and access their nature of damage at various chilli production stages **LU-2:** Determine the dosage and method of application of pesticides		

Module 6: Carryout harvesting and post harvesting management		
Learning Units	**Assessment methodology**	**Scheduled dates**
LU-1: Recognize the picking stage and pick the ripened chillies properly **LU-2:** Pack and transport the freshly harvested chillies to the drying area **LU-3:** Undertake drying by following the suitable procedures **LU-4:** Pack the dried chillies in suitable material and transport to the godowns or market **LU-5:** Store chillies under proper conditions		

5. LIST OF TOOLS AND EQUIPMENTS

S. No.	Description	Quantity
1.	Sampler	03
2.	Soil sampler	03
3.	Triple beam balance	02
4.	ELISA reader for mycotoxin analysis	02
5.	Photographs of normal and damaged chilli pods (available in research reports)	
6.	Sieves	
7.	Sprayer for applying fungicides/insecticides	03
8.	Phosphine meter	10
9.	Knap sacks sprayer	03
10.	Laser leveller	02
11.	Ridger	02
12.	Photographs of common weeds	
13.	Photographs of various pest insects	

14.	pH meter	10
15.	TDS meter	10
16.	Sickles	10
17.	Mould board plow	05
18.	Inch tape	03
19.	Thermometer	10
20.	Moisture meter	10
21.	Tool used for turning of chilli pods during drying	03
22.	Donkey cart	02
23.	Pick axe	10
24.	Tractor	02
25.	Sheet cover for chilli during night at drying stage	
26.	Nozzles	12

27.	Magnifying glass	05
28.	Khurpee	10
29.	Water sprinkler	10
30.	Cultivator	02
31.	Magnet	05
32.	Seed counter board	03
33.	Chilli cursher	03

6. LIST OF CONSUMABLES

- Varieties of chilli
- Blotter paper
- Petri dishes
- Sample collection bags
- Gloves
- ELISA test kits for aflatoxin analysis
- Mask
- Fungicides/Insecticides
- Tags
- bags
- Phosphine tablets
- Green net
- Plastic sheet
- Blotter paper
- Petri dishes
- Sample collection bags
- Chilli seeds
- Pots
- Weedicides
- Precautionary kit for applying weedicides including mask, gloves etc.

- Soil sample collection bags
- Fertilizers
- Dehydrants like Victoria oil
- Pesticides
- pH strips
- First aid box
- Farmyard manure
- Organic and inorganic fertilizers
- Fertilizer Supplement
- Straws
- Pots
- Chilli seeds
- Diesel
- Mobile oil
- Tetrazolium powder
- Stationery items e.g. pen, pencil, calculator etc.

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