

National Vocational Certificate Level 2 in Agriculture (Chilli Processing)

CBT Curriculum

NATIONAL VOCATIONAL & TECHNICAL TRAINING COMMISSION

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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	Manage the procurement of chillies	32	128	160
2	Store chillies in the factory area	32	128	160
3	Manage the milling process	40	160	200
4	Carryout packing of processed chillies	24	96	120
5	Assure the quality of chilli processing	32	128	160

1.2 Duration of the course:

The proposed curriculum is composed of 5 modules that will be covered in 800 hrs. It is proposed that the course may be delivered in a 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	**160 hrs (20%)**
Practical	**640 hrs (80%)**

1.3 Purpose of the training programme:

The purpose of the training is to provide skilled manpower to improve the existing chilli processing practices. This will improve the quality of chillies in terms of consumer‟s acceptability and safety. The availability of such quality of chillies in the local and international market will ultimately bring economic benefits to the producers and processors.

1.4 Specific characteristics of this training programme:

- The training programme shall be organized in an institute that posses the capability of chillies processing or in a nearby chilli industry.
- This training programme will be more productive for the people who may already be involved in chilli processing/business.
- The training program shall be more effective and beneficial if the trainers have experience and knowledge about chilli production, processing, safety and other aspects of handling.

1.5 Main objectives of the training programme

Following are the main objectives of the training programme:

- To build the capacity in trainees for adopting Good Manufacturing Practices at all stages of chilli processing leading to the improvement in quality and milling yield
- To prevent contamination of unwanted materials, organisms and substances in the chillies ultimately marketed in form of finish product
- To develop characteristics among the trainees such as self reliance, reliability, responsibility, team sense and ability to lead the program in the field
- To process chillies using improved procedures
- To protect chillies during storage in factory ware house
- To assure the maintenance of chillies quality during processing and packaging
- To provide safe and better quality chillies to the consumers

1.6 Skill development by action orientation:

The student must have the following skills after action orientation:

- Collaborate and lead to a positive community change and improvement in the system
- Ensure hygienic practices at work
- Contribute in creating an environment that may lead to safe handling of produce during processing
- Perform the improved tasks in a responsible manner
- Develop a sense of duty

1.7 Entry level of trainees

- Matric preferably Intermediate
- Traceable reference

1.8 Minimum qualification for teachers

Minimum qualification for trainers should be a BSc. degree in Food science and technology or Diploma holder (DAE) in food science and technology with five years of relevant experience.

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 processing 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 Packaging Practices
- Good Storage Practices (GSP)
- Pakistan Standard and Quality Control Authority (PSQCA). 2009. Standard Development Centre, 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)
- Environment Protection Agency (EPA)

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.

- 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, vol45(5). Page no 1669-1672..

1.12 Suggested distribution of modules

Following is the suggested sequence of modules:

Module-1: Manage the procurement of chillies
Module-2: Store chillies in the factory area
Module-3: Manage the milling process
Module-4: Carryout packing of processed chillies
Module-5: Assure the processing of good quality chillies

The module 5 may be taught along with modules 2, 3 and 4.

1.13 Definition of trade

Chillies produced using traditional practices are liable to quantitative and qualitative deterioration that ultimately results into economic losses to the growers and the exporters. Moreover the occurrence of toxins in the produce has an impact on the health of consumers. This course aims to provide safe and better quality chillies to consumesr by adopting modern and systematic methods of processing. It also aims to protect whole and powdered

chillies from contamination of toxic chemicals of health concern by bringing improvements in storage, processing and marketing procedures. The course will develop expertise among different stake holders in chilli processing by providing them specific trainings, keeping in view their job requirements.

1.14 Competencies gained after completion of the course

After the completion of the course, the trainees will be able to:

- Select healthy and appropriate whole chillies for processing
- Recognize the damaged chillies in a lot at the time of procurement
- Inspect and select the sites for storage of chillies and store the whole chillies (raw material) and chilli powder (finished product) using recommended procedures
- Perform milling of whole chillies as per SOPs
- Monitor the chilli during storage for insect pest and to control them using appropriate procedures
- Select the appropriate packaging material for whole chillies and chilli powder
- Pack the finished product (whole or powder) by using appropriate material and procedure
- Assure the quality of chillies throughout the processing and packaging stages

1.15 Worker Traits

- Good health
- Data recording and analytical skills
- Hardworking

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

1.16 Opportunities for employment and advancement

- Chilli processing units
- Condiments Processing industries
- Seasoning manufacturing
- Chilli traders and exporters
- Self employment

2. OVERVIEW OF THE CURRICULUM FOR CHILLI PROCESSING

Module Title and Aim	Learning Units	Theory[1] Days/hours	Workplace[2] Days/hours	Timeframe of modules
Module 1: Manage the procurement of chillies **Aim:** To identify, select and procure suitable whole chilli lots for processing	**LU-1:** Identify the appropriate lots of whole chillies for procurement from the market **LU-2:** Undertake the testing of offered lot or get the analysis done from authenticated laboratory **LU-3:** Select the chilli lot for procurement **LU-4:** Segregate the appropriate pods of the basis of their physical appearance **LU-5:** Manage the transportation of whole chillies to the factory	32	128	160
Module 2: Store chillies in the factory area **Aim:** To store chillies using suitable procedures for protection from insect pests and microbial attack in order	**LU-1:** Inspect and select the site/ware house for storage of whole chillies **LU-2:** Recognize the insect pest and their nature of damage during storage **LU-3:** Determine the dosage and method of application of fumigants **LU-4:** Store the chillies under proper conditions	32	128	160

[1] Learning hours in training provider premises,

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

to maintain the quality				
Module 3: Manage the milling process **Aim:** To undertake milling of chillies following appropriate procedures and hygienic conditions	**LU-1:** Prepare the whole chillies for milling into powder **LU-2:** Check the milling unit and prepare the machines for milling **LU-3:** Undertake milling of whole chillies into powder of desired specifications **LU-4:** Check and maintain the hygienic conditions during milling	40	160	200
Module 4: Carryout packing of processed chillies **Aim:** To pack the processed chillies including chilli powder using suitable packaging material	**LU-1:** Select the suitable packing material **LU-2:** Check and operate the packaging machine **LU-3:** Undertake packaging of processed chillies	24	96	120
Module 5: Assure the processing of good quality chillies **Aim:** To assure the maintenance of the	**LU-1:** Check the quality of raw chillies **LU-2:** Check and assure the quality of stored chillies **LU-3:** Check and assure the quality of chillies during processing **LU-4:** Check and assure the quality of finished product	32	128	160

quality of chillies before, during and after processing	**LU-5:** Maintain the general laboratory standards			

3. CHILLI PROCESSING CURRICULUM CONTENTS (Teaching and Learning Guide)

3.1 Module 1: Manage the procurement of chillies

Objective of the Module: To identify, select and procure suitable whole chilli lots for processing

Duration: 160 hours **Theory:** 32 hours **Practice:** 128 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU-1: Identify the appropriate lots of whole chillies for procurement from the market	**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	• Chilli varieties and its sub types • Hybrid varieties • Healthy pods/seeds • Damaged pods/seeds • Shrivelled pods • Discoloured pods • Effect of procurement of good quality of chillies on the quality of finished product • Procedure to determine the	Total: 60 hrs. Theory: 12 hrs. Practical: 48 hrs.	• Sampler (3) • Triple beam balance (2) • Stationery items e.g. pen, pencil, calculator etc **Consumables:** • Varieties of chilli • Sample collection bags	Theory: Class room Practical: • Chilli warehouse/chilli market • Laboratory

	proportion of different sub types of Dandi cut chillies within a chilli lot • Distinguish between normal and damaged pods • Identify shrivelled chilli pods • Recognize the chillies that are fungal infested, physically damaged, discoloured etc • Calculate the proportion of normal pods in a lot • Calculate the proportion of each type of damaged pods in a lot • Calculate the cost analysis of chilli lot	proportion of healthy pods in the offered consignment • Physical examination of chillies • Role of moisture in chilli quality • Role of aflatoxin in chilli supply chain • Role of chilli color in chilli quality • Role of pungency in chilli quality • Permissible limits of aflatoxin in various countries and prevailing situation in Pakistan • Impact of mixing of damaged pods with healthier pods • Knowledge about various chilli markets in Pakistan			

	• Negotiate the price of selected chilli lot • Explore different markets for chilli procurement • Recognize the chilli variety which is preferred for processing				
LU-2: Undertake the testing of offered lot or get the analysis done from authenticated laboratory	• Handle samplers • Handle sample dividers in the market • Draw the random samples using appropriate equipment and procedure • Perform mixing and dividing of primary samples	• Type of chillies and their suitability for chilli processing • Introduction to different types of samplers and dividers • Random sampling for obtaining representative sample • Importance of randomized chilli sampling • Equipment requirement and their use for sampling	Total: 25 hrs. Theory: 5 hrs. Practical: 20 hrs.	• Stationery items e.g. pen, pencil, calculator etc • Samplers (3) • Moisture meter (3) • Aflatoxin meter (3) **Consumables:** • Chilli sample collection bags • Varieties of chillies	Theory: Class room Practical: • Chilli market • Visit of chilli testing laboratory

	to prepare composite sample from primary samples • Select the sampling bag • Label the sample to include the information like date of sampling, sample collector name, chilli lot identity etc. • Prepare representative samples • Seal the sample to protect and preserve the sample • Ascertain the quality of chilli pods offered for procurement by undertaking physical observation or examination	• Basic requirements of chilli for processing • Important components of a chilli analysis report • Interpretation of chilli analysis report • Importance of correct labelling • Knowledge about sampling bags • Storage of chilli samples to conserve moisture and other parameters • Impact of physical observation during selection of lot • Determination of moisture content • Determination of aflatoxin in chilli supply chain • Determination of color in chilli quality • Determination of pungency in chilli quality • Separation of foreign material from selected lot			

	• Perform moisture test using portable moisture tester or get the moisture tested from laboratory • Perform aflatoxin test using portable aflatoxin tester or get it analysed from laboratory • Calculate the proportion of foreign matter in chilli lot • Perform pungency test or get it tested from laboratory • Perform color test by visual examination or get it tested laboratory				

LU-3: Select the chilli lot for procurement	• Determine the physical condition of chilli sample representing a specified chilli lot • Determine the quality of chilli lot by evaluating test report • Distinguish between good and poor chilli lot • Compare different types of lots keeping in view the price structure • Select the whole chilli lots on the basis of physical examination, analytical report and offered price • Negotiate on the	• Differentiation between old and new crop • Impact of mixing of old and new crop • Characteristics of good quality chillies • Basic requirement for the selection of good quality chillies • Trends of chilli market • Distinguish between damaged and normal pods • Difference between pure and hybrid chilli varieties • Personnel characteristics required at the time of selection of chilli lot • Calculation of cost	Total: 25 hrs. Theory: 5 hrs. Practical: 20 hrs.	• Stationery items e.g. pen, pencil, calculator etc • Photographs of old and new chilli pods (available in research reports)	Theory: Class room Practical: • Chilli market

	price • Avoid the mixing of good and bad quality chilli lots • Decide suitable chilli lots for processing • Procure good chilli lots that are normal in shape, size, color, disease free, belongs to one variety etc from reliable dealers/traders	effectiveness of chilli lot at the time of selection • Selection of suitable chilli lot on the basis of following: - Proportion of damaged pods - Percentage of foreign matters - Color - Pungency - Proportion of sub varieties - Offered price - Shrivelled pods - Moisture content - Aflatoxin levels			
LU-4: Segregate the appropriate pods on the basis of their	• Differentiate between healthier and damaged pods	• Description of different types of damaged pods including	Total: 25 hrs.	• Stationery items e.g. pen, pencil, calculator etc • Photographs of normal	Theory: Class room/farm field Practical:

physical appearance	• Identify various types of damages including discoloration, shrivelling, immaturation etc. • Recognize the extent of damaged in the chilli pods e.g. minor, moderate and severe. • Identify the damaged pods that are required to be separated from the chilli lot • Test the proportion of damaged pods by using appropriate test like visual analysis • Separate damaged pods from chilli lot	- discoloured - immature - cracked - shrivelled - viscera bored - viscera opened - black spotted - fungal damaged • Determination of extent of damaging in chilli pods • Damaged classification i.e minor, moderate and severely damaged pods • Impact of minor, moderately and severely damaged pods on the overall quality of chilli lot • Calculation of the percentage of minor, moderate and severe pods • Types of damaged pods that should be separated from chilli lot • Procedures for segregating severely damaged pods	Theory: 5 hrs. Practical: 20 hrs.	and damaged chilli pods (available in research reports) **Consumables:** • Gloves • Mask • Bags	• Chilli market • Laboratory

	• Handle severely damaged chilli pods • Identify the suitable pods for processing • Segregate the sub types within Dandi cut based on physical characteristics • Separate shrivelled chilli pods • Separate infested chillies from the chilli lot	• Impact of appropriate/healthier/damaged pods on chilli processing • Physical characteristics of dandi cut variety • Procedure for handling of different types of damaged pods separated from lot			
LU-5: Manage the transportation of whole chillies to the factory	• Determine the suitability of transport to carry raw chillies • Select suitable transport for chillies for transporting	• Importance of transportation in chilli business • Requirements for chilli transportation • Transportation of chillies	Total: 25 hrs. Theory: 5 hrs. Practical: 20 hrs.	• Stationery items e.g. pen, pencil, calculator etc. **Consumables:** • Gloves • Mask	**Theory:** Class room/farm field **Practical:** • Chilli market

	chillies from market to factory • Negotiate with the transporter on price • Supervise the loading of chillies on transport to avoid over filling, damaging etc • Transport chilli bags from market to factory • Calculate the cost effectiveness of transport • Determine the impact of improper transport on	from market to factory • Impact of inappropriate transport on chilli quality • Draw backs of over loading on chilli quality • Calculation of cost effectiveness of transportation • Transportation of chilli during unfavourable weather • Precautionary measures for transportation of chillies during unfavourable weather • Maintenance of hygienic conditions of vehicle during transportation • Maintenance of record of selected chilli lot before		• Plastic sheets to protect chillies from rain	

	damage chilli during transportation • Handle the transportation during overcast conditions • Supervise the unloading of chillies from transport to factory inlet • Record keeping of procured chilli lot	transportation			

3.2 Module 2: Store chillies in the factory area

Objective of the Module: To store chillies using suitable procedures for protection from insect pests and microbial attack in order to maintain quality

Duration: 160 hours **Theory:** 32 hours **Practice:** 128 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU-1: Inspect and select the site/ware house for storage of whole chillies	• Inspect the storage site to determine its suitability for the storage of chillies • Check the site for insect and rodent pests • Identify insect species inhabiting the store • Identify type of rodents present in and around ware house • Inspect the storage site for presence of fungi	• Prerequisites of good storage management • Factors effecting storage of chillies • Impact of temperature, humidity, packing material etc.on seed viability and chilli quality during storage • Maintenance of storage conditions viz. humidity, temperature etc during storage period	Total: 40 hrs. Theory: 8 hrs. Practical: 32 hrs.	• Stationery items e.g. pen, pencil, calculator etc. • Magnifier (10) • Photographs of insect and rodent present in chilli store • Humidity meter (5) • Thermometer (5) **Consumables:** • Petri dishes • Blotter paper	Theory: Class room Practical: • Chilli godowns/ storage area

	• Inspect the storage site for proper ventilation • Check that the storage area is suitable for fumigation • Check the storage site for maintaining the humidity and temperature • Measure the total storage area in meter^3 • Examine the storage conditions • Calculate the feasibility of storage site	• Types of storage • Possible modes of storage • Impact of storage fungi on chilli quality • Calculation of storage area • Frequency of fumigation during storage period			

LU-2: Recognize the insect pest and their nature of damage during storage	• Identify the insect pests of chillies • Monitor the chilli lots for determining the level of insect activity • Collect samples for insect identification and their comparative occurrence • Identify the insect species that can affect the quality of chillies • Identify the larvae of various insects • Calculate the level of infestation of insects • Determine the type of damage caused by particular insects • Assess the mode of action of particular insect species • Determine the economic threshold	• Types of 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 fungal diseases • Developmental stages of insect pests • Feeding sites of insects • Sampling for detection of insects and their relative abundance • Importance of economic threshold level (ETL) of different insect species • Determining the timing	Total: 40hrs. Theory: 08 hrs. Practical: 32 hrs.	• Stationery items e.g. pen, pencil, etc • Photographs of various insect pests • Magnifying glass (10) **Consumables:** • Sample collection bags • Insect collecting vials • Brush	Theory: Class room /farm field Practical: • Chilli godowns/ storage area

	levels (ETL) for different insect pests	of pesticide application keeping in view their ETL			
LU-3: Determine the dosage and method of application of fumigants	• Differentiate the types of insecticides or fumigants • Select appropriate insecticides or fumigants • Determine the frequency and interval of fumigation keeping in view infestation levels • Apply suitable pesticides to disinfect the storage site if required • Apply the proper dosage of fumigants according to the capacity of ware house • Take all necessary precautionary	• Types of insecticides or fumigants and their use • Mode of action of different types of insecticide and fumigants • Differentiation between generic and branded pesticides • Determining the need of fumigant applications • Timings and frequency of fumigation • Procedures of applying fumigants • Principles of safe application of fumigants • Knowledge about precautionary	Total: 40 hrs Theory: 08hrs Practical: 32 hrs	• Stationery items e.g. pen, pencil, calculator etc • Sprayers (5) • Nozzles (10) • Sealer (3) **Consumables:** • Phosphine tablets • Masks • Gloves • Covering sheets (PE sheets) • Pesticides	Theory: Class room/farm field Practical: • Chilli growing field

	measures during and after fumigation	measures for operators • Determination of correct dose of fumigant for various types of godowns/stacks			
LU-4: Store the chillies under proper conditions	• Pack and tag the chilli lots for identification by recording details like date of entry, persons involved etc. • Store chillies under suitable conditions to maintain its quality and wholesomeness by keeping them free from insects, rodents and microbial attack etc. • Undertake periodic inspection of stores to ensure chilli quality • Determine the fumigation requirements to arrest insect infestation	• Techniques used for storage of chillies for required duration • Periodic Inspection of stores and produce • Determination of the frequency of fumigation • Procedure for undertaking fumigation of chillies • Safety measures during fumigation • Maintenance of optimum storage conditions like humidity, temperature etc	Total: 40 hrs Theory: 08hrs Practical: 32 hrs	• Stationery items e.g. pen, pencil, etc • Phosphine meter (3) **Consumables:** • Phosphine tablets • Plastic sheet (PE sheets) • Sample collection bags	Theory: Class room Practical: • Chilli godowns/ storage area

	during storage • Undertake fumigate adopting suitable procedures for application of fumigants and taking the require safety measures • Maintain the storage conditions unfavourable for growth and development of fungi and insects ensuring proper ventilation • Store chillies in suitable size stacks keeping in view the capacity of ware house	• Record keeping for storage inventory and conditions • Good storage management of chillies • Storage capacity and its optimum utilization			

3.3 Module 3: Manage the milling process

Objective of the Module: To undertake milling of chillies following approprioate procedure and hygenic conditons

Duration: 200 hours **Theory:** 40 hours **Practice:** 160 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU-1: Prepare the whole chillies for milling into powder	• Check and select the physical quality of chillies for pre milling process • Separate the unwanted materials from the batch • Select chilli lot prior to processing on the basis of following: - Aflatoxin - Moisture content - fungal load - pungency etc • Select the chilli type(s) by keeping in view the	• Pre-requisites of chilli milling • Cleaning the chilli pods before milling • Importance of preparation of whole chillies before milling • Milling procedure for whole chillies • Separation of unwanted materials from the given chilli batch viz foreign material etc.	Total: 50 hrs. Theory: 10 hrs. Practical: 40 hrs.	• Stationery items e.g. pen, pencil, etc. • Aflatoxin meter (3) • Moisture meter (3) **Consumables:** • Blotter paper • Petri dishes • Bags	Theory: Lecture hall/chilli processing unit Practical: • Chilli processing area/unit

	finished product • Identify chilli lot for specific ultimate product • Prepare whole chillies as per requirement of finished product like - Whole pods - Crushed pods - Chilli powder - Curry recipes • Prepare whole chillies for milling in to crushed and powder • Handle the chillies according to the type/variety	• Criteria of selecting chilli lot viz. - Aflatoxin - Moisture content - Fungal load - Pungency etc. • Procedures of preparing whole chillies according to the finished product - Whole pods - Crushed pods - Chilli powder - Curry recipes • Procedures of handling the whole chillies according to the type/variety			
LU-2: Check the milling unit and	• Adjust the rollers gap if and when required	• Knowledge about milling machine	Total: 50 hrs.	• Stationery items e.g. pen, pencil,	Theory: Class room/chilli

prepare the machine for milling	• Perform pre-cleaning of milling machine • Calibrate milling machine before processing • Check the machine before running the batch • Maintain the milling machine and accessories • Perform post cleaning of milling line by adopting appropriate procedures • Respond upon any type of emergency such as - Power failure - Accidents - Mechanical failure - Short circuit etc.	• Different types of milling machines • Inspection for the performance of milling machine • Knowledge about the important components of machine before starting the milling process • Calibration of milling machine • Maintenance of milling machines • Operation of milling machine • Safety measures during operation	Theory: 10 hrs. Practical: 40 hrs.	etc • Milling unit • Mechanical Tools such as screw driver, spanner, etc • Vernier Calliper (5) **Consumables:** • Safety utilities - -Gloves - -Masks - -Safety - -shoes - -Googles - -Halmet - -Hair cap - -Dangri • First aid box	processing unit Practical: • Chilli processing area/unit

	• Respond to the situation, processed material, milling machine etc, in case of emergencies • Record the information related with machinery such as - date, time and personal involved in cleaning - List of accessories - Date and time of emergency - Calibration date and done by whom • Calculate the efficiency of milling machine	• Problems related to milling machine • Causes of problems in milling machine • Trouble shooting in milling machine • Determination the efficiency of milling machine • Milling machine requirements such as type of floor, area, ventilation etc.			
LU-3: Undertake milling of whole chillies into powder of desired specification	• Undertake milling of round shaped chillies • Undertake milling of long shaped chillies	• Importance of milling process of chillies • Proper timing of milling • Evaluation of milling	Total: 50 hrs. Theory: 10 hrs. Practical: 40 hrs.	• Stationery items e.g. pen, pencil, calculator etc. • Milling unit • Mechanical Tools such as screw driver,	Theory: class room/chilli processing unit

	• Calculate the ratio of different varieties/types of chillies if required • Adjust the proportion of different chilli varieties accordingly • Undertake milling of whole chillies according to the end product viz. - Crushed pods - Chilli powder - Curry recipes • Calculate the ratio of different spices for recipes mix • Perform mixing of different spices when the recipe mix is desired	process • Different milling techniques for round and long shaped chillies • Procedures of milling of whole chillies in to powder • Calculation of milling yield • Undertaking the mixing of spices when needed • Calculation of different chilli types/varieties according to their characteristics (viz. pungency, color etc) and ultimate product • Quality characteristics viz., color and pungency of different chilli		spanner, etc **Consumables:** • Safety utilities - -Gloves - -Masks - -Safety - -shoes - -Googles - -Halmet - -Hair cap - -Dangri • Bags	Practical: • Chilli processing area/unit

	• Calculate milling yield in terms of powder collected after every batch • Adopt safety and precautionary measures during milling • Handle the substandard material properly	types/varieties • Requirement of pungency and color for different finished products viz. crushed pods, chilli powder and curry recipes • Precautions during the process of milling			
LU-4: Check and maintain the hygienic conditions during milling	• Perform pre and post cleaning of milling line using appropriate materials/solvents and procedures • Avoid unhygienic materials in and around the production area • Inspect the production area for hygienic conditions	• Knowledge about the hygienic conditions during milling • Importance of hygienic conditions during milling • Sanitation of the production line • Impact of unhygienic conditions on the quality	Total: 50 hrs. Theory: 10 hrs. Practical: 40 hrs.	• Stationery items e.g. pen, pencil, etc • Milling unit • Mechanical Tools such as screw driver, spanner, etc • Instruction charts	Theory: Class room/chilli processing unit Practical: • Chilli processing area/unit

	• Maintain the hygienic conditions during the milling process • Identify the conditions that are appropriate for milling • Adopt safety measures for the operators and milling workers • Check the hygienic status of operator/worker • Handle the undesirable materials present in processing area • Manage the instructions related to hygiene	of finished product • Identification of conditions that are not appropriate for milling • Difference between the precautionary and hygienic measures • Procedure to inspect the hygienic conditions of milling line and area • Procedure to check the hygienic status of operator and works • Safety measures of personnel during milling process • Hygienic requirements/standards for operators and workers		**Consumables:** • Safety utilities - Gloves - Masks - Safety - shoes - Googles - Halmet - Hair cap - Dangri • First aid box • Bags	

		• Follow instructions related to hygiene whether in the form of signs or text			

3.4 Module 4: Carryout packaging of processed chillies

Objective of the Module: To pack the processed chillies including chilli powder using suitable packaging material

Duration: 120 hours **Theory:** 24 hours **Practice:** 96 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU-1: Select the suitable packing material	• Determine the quality of packaging material • Identify/initiate procurement of appropriate packing material for processed chillies • Decide appropriate packing material for processed chillies	• Importance of packaging of processed chillies • Different types of packaging materials • Merits and demerits of various packing material • Use of appropriate packing for processed chillies • Differentiation between suitable or not suitable	Total: 30 hrs. Theory: 6 hrs. Practical: 24 hrs.	• Stationery items e.g. pen, pencil, Record books etc. **Consumables:** • Tags • Bags • Packaging materials	Theory: Class room /chilli processing unit Practical: • Chilli processing area/unit

	• Procure the selected packaging material • Avoid substandard materials for packaging • Cost effectiveness of selected packaging materials • Store the packaging materials properly • Maintain and record the packaging materials • Maintain the hygienic conditions	material • Characteristics of material suitable for packaging • Impact of usage of substandard packaging material on end product quality • Maintenance of procurement record such as - Date of procurement - Source of procurement - Cost - Types of packaging materials • Maintenance of storage conditions of packaging materials			

		• Safe transportation of packaging materials from market to factory area			
LU-2: Check and operate the packaging machines	• Prepare the packaging machines and its accessories for operation • Operate the packaging machines • Calibrate the packaging machines with regular time interval • Maintain the packaging machines regularly • Check the	• Knowledge about packaging machine • Different types of packaging machines • Operation of packaging machine • Safety measures during packaging operation • Inspection for the performance of packaging machines • Knowledge about the important components of machines before starting	Total: 30 hrs. Theory: 6 hrs. Practical: 24 hrs.	• Stationery items e.g. pen, pencil, Calculator etc • Packaging machine • Vernier calliper (5) • Stop watch (5) **Consumables:** • Packing material • First aid box	Theory: Lecture hall/chilli processing unit Practical: • Chilli processing area/unit

	machines before running the batch • Adopt safety measures for operators and workers during packaging • Perform pre and post cleaning of packaging machines following appropriate procedures • Take action on any type of emergency during packaging process like electric shut down, any type of mishap with personnel and machine etc. • Overcome the emergency	the packaging process • Calibration of packaging machines • Maintenance of packaging machines • Problems related to packaging machines • Causes of problems • Basic trouble shooting in packaging machines • Determination of efficiency of packaging machines • Packaging machines requirements such as hygiene, area, ventilation etc.		• Safety Utilities -Gloves -Masks -Safety -Shoes -Googles -Halmet -Hair cap -Dangri	

	situation, processed material, packaging machine etc. • Record the related information with machinery such as - Date, time and personal involved in cleaning - List of accessories - Date and time of emergency - Calibration date and person • Calculate the efficiency of packaging machine				
LU-3: Undertake packaging of processed chillies	• Pack the processed chillies including - chilli powder	• Knowledge about chilli packaging • Importance of packaging	Total: 60 hrs. Theory: 12 hrs.	• Stationery items e.g. pen, pencil, etc • Packaging	Theory: Class room /chilli processing unit

	- crushed chillies - mix recipes - whole pods • identify the substandard packed chillies • Separate substandard packed chillies • Handle the substandard packed chillies • Check and maintain the personnel hygiene in packaging area • Maintain and calibrate the metal detector • Handle	• Importance of tagging/labelling for identification • Impact of substandard packaging of processed chillies • Handling of substandard packed chillies • Description of substandard packed chillies - Damaged boxes - Improper sealing - Absence or misprinting of manufacturing dates, batch numbers, expiry dates etc. • Hygienic condition of personnel and packaging area	Practical**:** 48 hrs.	and labelling machine • Weighing machine (3) • Standard weights (5) **Consumables:** • Packaging material • Tags • Bags	Practical: • Chilli processing area/unit

	undesirable material detected by metal detector • Segregate and label different chilli lots carefully • Check the labelling details such as - Batch number - Manufacturing date - Expiry date - Retail price - Net weight - Company monogram etc. • Shift the packed and processed	• Calibration of packaging machines • Inspection of weight after completion of packaging • Proper stacking of packed material • Importance of properly shifting the packed material to the store • Knowledge about the maintaining the proper storage condition in accordance to the finished product requirement • Storage of packed material • Need for maintaining the hygienic conditions of store for storage of packed material			

	material with care • Store the packed and processed material at the properly maintained store before marketing • Maintain the hygienic condition of ware house for processed material	• Difference between storage of exportable packed chillies and chillies intended for local consumption • Safety measures during packaging			

3.5 Module 5: Assure the processing of good quality chillies

Objective of the Module: To assure the maintenance of the quality of chillies before, during and after processing

Duration: 160hours **Theory:** 32hours **Practice:** 128hours

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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU-1: Check the quality of raw chillies	• Handle samplers • Handle sample dividers • Draw the random samples using appropriate equipment and procedure from the vehicle loaded with chilli bags • Perform mixing and dividing of primary samples to prepare a composite sample • Prepare representative and working sample from composite sample	• Types of samplers • Handling of samplers • Techniques of sampling • Preparation of different types of samples like - Random samples - Composite samples	Total: 32 hrs. Theory: 6 hrs. Practical: 26 hrs.	• Stationery items e.g. pen, pencil, etc. • Sampler (3) • Sample divider (3) • Sealer (3) • Aflatoxin meter (3) • ELISA reader (2) • Moisture meter (2) • Digital balance (2) • Microscope (2)	**Theory:** Class room/chilli processing unit **Practical:** • Chilli processing area/unit

	• Label the sample to include the information like date of sampling, sampler name, chilli lot identity etc. • Seal the sample to intact the condition of sample • Place the samples properly in laboratory • Perform the analytical tests such as - Moisture content - Color - Proportion of damages - Shrivelled pods - Foreign matters - Aflatoxin level - Pungency - Fungal load etc • Handle the equipment to perform analytical tests	- Sub samples - Working samples • Impact of proper labelling • Procedure of sampling • Determination of moisture content • Determination of aflatoxin level • Determination of pungency • Separation of foreign matters • Detection of fungal load		**Consumables:** • Tags • Bags • Petri dishes • Gloves • Masks • Blotter paper • Aflatoxin kits • First aid box	

	• Report the results of analytical tests to the immediate and other concerned personnel or departments • Interpret the results	• Description of analytical equipments • Operational procedures for analytical equipment • Quality characteristics of raw chillies for processing in to a specific type of finished products • Maintaining the equipment			
LU-2: Check and assure the quality of stored chillies	• Optimize the storage condition at factory level like - Temperature - Humidity - Ventilation etc • Maintain the storage condition • Draw the random samples of stored	• Optimization of storage conditions • Maintenance of storage conditions like temperature, ventilation, humidity etc. • Different procedures	Total: 32 hrs Theory: 6 hrs Practical: 26 hrs	• Sampler (3) • Sample divider (3) • Mixer (3) • Thermometer (10) • Humidity meter (10) • Trays (10) •	

	chillies using appropriate equipment and procedure from the factory store. • Prepare the composite sample from primary samples • Make representative and working sample from composite sample • Label the storage samples properly • Determine the frequency of sampling to assure the proper storage • Handle the raw and processed chillies under storage for quality assurance • Check the quality of stored chillies by analyzing the parameters such as - Moisture content	of sampling • Use of appropriate equipment for sampling • Drawing, preparation, mixing and sub division of different samples such as primary sample, composite sample, representative sample and working sample • Labelling the sample appropriately • Assurance of quality parameters • Maintenance of record of each sample at the time of storage		**Consumables:** • Record books • Bags • Tags	

	- Color - Proportion of damages - Shrivelled pods - Foreign matters - Aflatoxin level - Pungency - Fungal load etc • Maintain and assure the traceability of each sample during storage • Maintain the record of quality assurance of stored chillies • Report the results to the concerned departments and also able to intimate in case of unusual results				
LU-3: Check and assure the quality of chillies during	• Draw the samples at different stages of chilli processing • Maintain the	• Maintenance and cleanliness of processing machine	Total: 32 hrs. Theory: 6 hrs.	• Samplers (3) • Moisture meter (3) • Aflatoxin meter (3)	

processing	cleanliness of processing machines after every batch
	• Check and assure the efficiency of processing machine
	• Assure the cleanliness of chilli pods before processing
	• Check the safety measures during processing
	• Inspect the presence of any un desirable material like
	  • Hairs
	  • Metals
	  • Straws
	  • Thread
	  • Rubber band etc
	• Check and maintain the hygienic conditions of workers in processing area
		• Efficiency assurance of processing machine
		• Assurance of chilli pods cleanliness before processing
		• Assuring the ratio of different spices in different recipes
		• Inspection of safety measures
		• Removal of undesirable materials during processing
		• Assurance of hygienic condition at processing area
		• Inspection of whole processing activity
			Practical: 26 hrs.	• ELISA meter (2)
				• Digital balance (2)
				Consumables:
				  • Blotter paper
				  • Petri dishes
				  • Aflatoxin kits	

	• Determine the frequency of sampling • Inspect the whole processing activity at regular intervals • Check the quality of under process chillies by analyzing the parameters such as - Moisture content - Color - Foreign matters - Aflatoxin level - Pungency - Fungal load etc • Report the results to the concerned departments • Respond at unexpected results				

LU-4: Check and assure the quality of finished product	• Draw the random samples of finished product using appropriate procedures • Prepare representative and working sample • Label the sample to include the information like date of sampling, sampler name, chilli lot identity etc. • Perform the analytical tests on the samples of finished product such as - Moisture content - Color - Aflatoxin level - Pungency - Fungal load etc In addition to above mentioned test the trainee will also be capable to perform the test on processed whole chillies such as	• Knowledge about packaging of chillies • Importance of packaging • Tagging/labelling of seeds for identification • Impact of substandard packaging of processed chillies • Handling of substandard packed chillies • Description of substandard packaging chillies - Damaged boxes - Improper sealing - Absence or misprinting of manufacturing dates, batch numbers, expiry dates etc.	Total: 32 hrs. Theory: 6 hrs. Practical: 26 hrs.	• Stationery items e.g. pen, pencil, etc. • Packaging and labelling machine • Moisture meter (3) • Aflatoxin meter (3) • ELISA reader (2) • Microscope (2) • Colony counter (3) **Consumables:** • Packing material • Tags • Aflatoxin kit • Bags • Blotter paper • Petri dishes • Test tubes • Potato dextrose agar (PDA)	Theory: Class room/chilli processing unit Practical: • Chilli processing area/unit

	- Proportion of shrivelled pods - Foreign matters - Proportion of damaged pods • Handle the equipment to perform analytical tests such as - Weighing balance - ELISA - Incubator - Colony counter - Magnifying glass - Microscope etc • Examine the proper sealing and packaging of finished product • Examine the substandard packed	• Hygienic condition of personnel and packaging area • Calibration of packaging machines • Checking and inspection of weight on completion of packaging • Proper stacking of packed material • Importance of proper shifting of packed material to the store • Storage requirements of the finished product • Storage of packed material			

	chillies • Examine the personnel hygiene of workers in packaging area • Maintain and calibrate the metal detector • Handle undesirable material detected by metal detector • Segregate and label different chilli lots carefully • Check the labelling details such as - Batch number	• Importance of keeping the hygienic conditions of packed materials store • Difference between storage of exportable packed chillies and chillies intended for local marketing • Safety measures during packaging			

	- Manufacturing date - Expiry date - Retail price - Net weight - Company monogram etc. • Shift the packed and processed material with care • Storage of packed and processed materials before marketing • Maintaining the hygienic conditions of stores for processed material				
LU-5: Maintain the general	• Avoid following - Smoking	• General Laboratory standards	Total: 32 hrs. Theory: 6	• Instruction charts • Standard weight	

laboratory standards	- Eating - Drinking • Avoid gathering of unauthorized persons in laboratory • Prepare and maintain the record of followings - Chemicals - Equipments - Accessories - Calibration - Test reports • Meet the requirements during specific tests. For example wear lab coat, gloves and mask during aflatoxin analysis • Assist the main analyst • Keep the glassware including beaker, flask, pipette,	• ISO 17025 standards • Description of different glassware such as - Cylinder - Beaker - Flask - Pipette etc • Handling and keeping of glassware • General precautionary measures that must be kept in mind while handling the sophisticated equipments • Laboratory conditions to be maintained for proper functioning of equipment • Impact of smoking on the laboratory	hrs. Practical: 26 hrs.	(5) • Hand Sanitizer (5) • Hand dryer (5) **Consumables:** • Record books • Dusters • Soaps dispenser • Tissue papers	

	cylinder etc carefully • Use glassware where needed • Follow the precautionary measures for instrument handling • Keep the operational and maintenance manuals of equipment in a proper place • Maintain the conditions of laboratory (like temperature, dust free etc.) required for equipment	functioning • Impact of usual habits that are restricted in laboratory on the analytical work and results • Impact of sub standard environmental conditions on the equipment performance, analytical results and others • Proper placement and procedure for glassware and equipment accessories in the lab			

4. ASSESSMENT GUIDANCE:

Good assessment practices should be adopted 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 assessments

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

- to the student: It will identify achievement and areas for further teaching and its level.
- to the teacher: It 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 carried out on completion of a course or module. This determines whether or not the student has "passed". It is - or should be - undertaken with reference to all the objectives or outcomes of the course, and is often 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 processor will include:

- Work performances, for example the milling of whole chillies into powder by taking care of hygienic conditions
- Demonstrations, for example demonstrating the inspection of site selected for storage of chillies (raw/processed)
- Direct questioning, where the assessor will ask the student how to recognize the damaged chillies in a lot during procurement of whole chillies etc.
- Paper-based tests, such as multiple choice or short answer questions at production line, hygienic and safety issues, working with others, packaging machines and their operation etc.

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

Examples for indirect assessment of a chilli processor will include:

- Selection of chilli lot on the basis of test report
- The quality of finished and processed product: the proper milling and packaging will ultimately end up with a good quality of finished product
- Storage of chillies: the methods adopted to store chillies to prevent pest attack

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 mill the whole chillies in to powder at factory area is to be assessed and certified, the assessment should involve performance criteria that are directly related to chilli processing. An interview about milling or production of different commodities other than chillies would not meet the performance criteria.

Reliability means that the assessment is consistent and reproducible. For example, if the work performance of recognizing the damaged pods in chilli lot 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 processing Curriculum

This curriculum consists of 5 modules:

- Module 1: Manage the procurement of chillies
- Module 2: Store chillies in the factory area
- Module 3: Manage the milling process
- Module 4: Carryout packing of processed chillies
- Module 5: Assure the processing of good quality chillies

4.5 Suggestions 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 Suggestions 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 production line, storage site, packaging area 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	20%	4%	16%
MODULE 2	20%	4%	16%
MODULE 3	25%	5%	20%
MODULE 4	15%	3%	12%
MODULE 5	20%	4%	16%
Total	100%	20%	80%

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

	PRACTICAL	THEORY
MODULE 1		
LU-1: Identify the appropriate lots of whole chillies for procurement from the market	**Trainee should 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 normal and damaged pods • Identify shrivelled chilli pods • Recognize the chillies that are likely to be fungal infested, physically damaged, discoloured etc • Calculate the proportion of normal pods in a lot • Calculate the proportion of each damaged pods in a lot • Calculate the cost effectiveness of chilli lot • Recognize the chilli variety which is preferable for processing	**Trainee will be asked for:** • Chilli varieties and its sub types such as Dandi cut • Hybrid varieties • Differentiate between healthy and damaged pods/seeds • Shrivelled pods • Effect of good quality of chillies on the quality of finished product • Procedure to determine the proportion of healthy pods in the offered consignment • How to perform physical examination of chillies • 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: Undertake the testing of offered lot or get the analysis done from authenticated laboratory	• Handle samplers and dividers • Label the sample to include the information like date of sampling, samplers name, chilli lot identity etc. • Prepare the representative samples • Seal the sample to intact the condition of sample • Ascertain the quality of chilli pods offered for procurement by undertaking physical examination • Perform moisture test using portable moisture tester • Perform aflatoxin test using portable aflatoxin tester • Calculate the proportion of foreign matter in chilli lot • Perform color test by visual means	• Type of chillies and their suitability for chilli processing • Introduction of different samplers and divider • Technique used for chilli sampling • Storage of chilli samples to conserve moisture and other factors • Importance of randomized chilli sampling • Equipment requirement and their use for sampling • Impact of physical observation during selection of lot • Determination of moisture content, aflatoxin, color and pungency in chilli • Separation of foreign material from selected lot
LU-3: Select the chilli lot for procurement	• Determine the physical condition of chilli sample • Determine the quality of offered chilli lot by evaluating the test report • Distinguish between the acceptable and inferior chilli lot • Compare chilli lots according to the demand	• Differentiation between old and new crop • Impact of mixing of old and new crop • Basic requirement for the selection of good quality chillies • Trends of chilli market

	prices and negotiate on the price • Decide suitable chilli lots for processing • Select good chilli lots that are disease free, pure variety etc from reliable dealers of chilli • Selection of suitable chilli lot on the basis of following: - Proportion of damaged pods - Percentage of foreign matters - Color - Pungency - Proportion of sub varieties - Offered price - Shrivelled pods - Moisture content - Aflatoxin levels	• Difference between pure and hybrid chilli variety • Calculation of cost effectiveness of chilli lot at the time of selection
LU-4: Segregate the appropriate pods on the basis of their physical appearance	• Differentiate between healthier and damaged pods • Identify various types of damages including discoloration, shrivelling, immaturation etc. • Recognize the extent of damaging in the chilli pods e.g. minor, moderate and severe.	• Description of different damaged pods including - discoloured - immature - cracked - shrivelled - viscera bored

	• Test the proportion of damaged pods by using appropriate test like visual analysis • Handle severely damaged chilli pods • Identify the suitable pods for processing • Segregate the sub types within Dandi cut based on physical characteristics • Separate shrivelled and infested chillies from the chilli lot	- viscera opened - black spotted - fungal damaged • Determination of extent of damaging in chilli pods and further classification into minor, moderate and severely damaged pods • Procedures for segregating severely damaged pods • Impact of appropriate/healthier/damaged pods on chilli processing • Physical characteristics of dandi cut variety • Procedure for handling of different damaged pods separated from lot
LU-5: Manage the transportation of whole chillies to the factory	• Determine the suitability of transport to carry chillies • Supervise the loading of chillies for transportation avoiding over filling, damaging etc • Calculate the cost effectiveness of transport	• Importance of transportation in chilli business • Requirements for chilli transportation • Impact of inappropriate transportation including overloading on chilli quality • Precautionary measures for transportation of chillies during unfavourable weather

	• Determine the impact of improper transport on damage to chillies • Supervise the unloading of chillies from transport to factory inlet • Record keeping of procured chilli lot	• Maintenance of hygienic conditions of vehicle during transportation • Maintenance of record of selected chilli lot before transportation
MODULE 2		
LU-1: Inspect and select the site/ware house for storage of whole chillies	• Inspect the storage site to check its suitability for the storage and fumigation of chillies • Identify insects, rodents and fungi at storage site • Check the site whether for maintenance of humidity and temperature • Measure the total storage area and calculate the volume of godown in meter^3 • Calculate the feasibility of storage site	• Prerequisites of good storage management • Factors effecting storage of chillies viz temperature, humidity, packing material etc. on seed viability and chilli quality during storage • Maintenance of storage conditions viz. humidity, temperature etc during storage period • Types of storage • Impact of storage fungi on chilli quality • Calculation of storage area

LU-2: Recognize the insect pest and their nature of damage during storage	• Identify the insect pests of chillies • Collect samples for insect identification and their comparative occurrence • Identify the insect species that damage chillies • Calculate the level of infestation of insects • Determine the type of damage caused by different species of insect pest	• Types of insect pests and their relationship with climatic factors • Identification of various pest species and their timings of occurrence • Losses due to insect pest attack • Role of insects as a vector of bacterial, viral and fungal diseases • Developmental stages of insect pests • Feeding preferences of insects • Importance of economic threshold level (ETL) of different insect species
LU-3: Determine the dosage and method of application of fumigants	• Differentiate the types of insecticides or fumigants • Apply suitable pesticides to disinfect the storage site if required • Apply the proper dosage of fumigants according to volume of storage • Adopt the precautionary measures during fumigation	• Types of insecticides or fumigants and their use • Differentiation between generic and branded fumigants • Timings, frequency and procedures of applying fumigants • Principles of safe use of fumigants • Precautionary measures for operators

LU-4: Store the chillies under proper conditions	• 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. • Fumigate by following appropriate procedures of application and safety measures • Determine the requirement for effective fumigation of chillies to control the insect infestation during storage	• Procedures used for storage of chillies • Periodic Inspection of stores and produce • Determination of the frequency of fumigation • Safety measures during fumigation • Maintenance of optimum storage conditions like humidity, temperature and their record keeping etc
MODULE 3		
LU-1: Prepare the whole chillies for milling into powder	• Check and select the physical quality of chillies during pre milling process • Separate the unwanted materials from the batch • Prepare whole chillies as per requirement of finished product like	• Pre-requisites for milling of chillies • Cleanliness of chilli pods before milling • Procedure of milling for whole chillies • Separation of unwanted materials from the

	- Whole pods - Crushed pods - Chilli powder - Curry recipes • Handle the chillies according to the type/variety	given chilli batch like foreign material etc. • Criteria of selecting chilli lot viz. - Aflatoxin - Moisture content - fungal load - Pungency etc. • Procedures of preparing whole chillies according to the finished product - Whole pods - Crushed pods - Chilli powder - Curry recipes
LU-2: Check the milling unit and prepare the machine for milling	• Adjust the rollers gap if and when required • Perform pre-cleaning of milling machines • Calibrate milling machines before processing • Check the machines before running the batch • Perform post cleaning of milling line by following appropriate procedures	• Different types of milling machines • Inspection for the performance of milling machines • Knowledge about the important components of machine to examine before starting the milling process • Calibration, maintenance and operation of

	• Respond upon any type of emergency such as - Power failure - Accidents - Mechanical failure - Short circuit etc. • Calculate the efficiency of milling machine	milling machine • Safety measures during operation • Problems, causes and their troubleshooting related to milling machine • Milling machine requirements such as type of floor, area, ventilation etc.
LU-3: Undertake milling of whole chillies into powder of desired specification	• Undertake milling of round and long shaped chillies • Calculate and adjust the ratio of different varieties of chillies if required • Undertake milling of whole chillies according to the end product viz. - Crushed pods	• Importance of milling process of chillies and its time management • Evaluation of milling process • Milling requirement and procedures for grinding round and long shaped chillies

	- Chilli powder - Curry recipes • Perform mixing of different spices for preparing recipes • Calculate milling yield in terms of powder collected after every batch • Handle the substandard material properly	• Basic consideration for mixing of spices • Quality characteristics specially color and pungency of different chilli types/varieties • Precautions to be under taking during the milling process
LU-4: Check and maintain the hygienic conditions during milling	• Perform pre and post cleaning of milling line with appropriate materials/solvents and procedures • Identify the conditions that are appropriate for milling • Check the hygienic status of operator/worker • Handle the undesirable materials present in processing area	• The hygienic conditions during milling • Sanitation of the production line • Impact of unhygienic conditions on the quality of finished product • Difference between the precautionary and hygienic measures • Procedure to check the hygienic status of production line and operator

		• Safety measures for personnel during milling • Follow instructions related to hygiene whether in the form of signs or text
MODULE 4		
LU-1: Select the suitable packing material	• Identify appropriate packing material for processed chillies • Cost effectiveness of selected packaging material • Store the packaging material properly	• Different types of packaging materials • Merits and demerits of various packing material • Use of appropriate packing for processed chillies • Characteristics of material suitable for packaging • Impact of usage of substandard packaging material on end product quality • Maintenance of purchase record such as

		- Date of purchasing - Source of purchasing - Cost - Types of packaging material
LU-2: Check and operate the packaging machine	• Prepare the packaging machines and its accessories for operation • Operate the packaging machines • Calibrate the packaging machines with regular time interval • Check the machines before running the batch • Perform pre and post cleaning of packaging machines by following appropriate procedures • Calculate the efficiency of packaging machines	• Different types of packaging machines and their operation • The important components of machine to examine before starting the process of packaging • Calibration and maintenance of packaging machines • Problems, cause and troubleshooting related to packaging machines • Hygienic requirements during packaging

LU-3: Undertake packaging of processed chillies	• Pack the processed chillies including - chilli powder - crushed chillies - mix recipes - whole pod • Identify, separate and further handling of substandard packed chillies • Segregate and label different chilli lots carefully	• Importance of packaging • Impact of substandard packaging of processed chillies • Description of substandard packed chillies - Damaged boxes - Improper sealing - Absence or misprinting of manufacturing dates, batch numbers, expiry dates etc. • Calibration of packaging machines • Impact of proper shifting of packed material to the store • Proper storage according to the finished product • Safety measures during packaging

MODULE 5		
LU-1: Check the quality of raw chillies	• Handle samplers and dividers • Perform mixing and dividing of primary samples to prepare composite sample • Prepare representative and working sample from composite sample • Label the sample to include the information like date of sampling, sampler name, chilli lot identity etc. • Seal the sample to keep its quality intact • Perform the analytical tests such as - Moisture content - Color - Proportion of damages - Shrivelled pods - Foreign matters - Aflatoxin level - Pungency - Fungal load etc • Handle the equipment to perform analytical tests	• Types, handling and techniques of sampling • Preparation of different types of samples like - Random samples - Composite samples - Sub samples - Working samples • Impact of proper labelling • Determination of moisture content, aflatoxin level, pungency, foreign matters, fungal load • Description of analytical equipments

	• Interpret the results	
LU-2: Check and assure the quality of stored chillies	• Draw the random samples of stored chillies using appropriate equipment and procedure from the factory store. • Prepare the composite sample from primary samples • Make representative and working sample from composite sample • Handle the raw and processed chillies under storage for quality assurance • Check the quality of stored chillies by analyzing the parameters such as - Moisture content - Color - Proportion of damages - Shrivelled pods - Foreign matters - Aflatoxin level - Pungency - Fungal load etc	• Optimization of storage conditions • Maintenance of storage conditions like temperature, ventilation, humidity etc • Assurance of quality parameters • Maintenance of record of each sample at the time of storage

LU-3: Check and assure the quality of chillies during processing	• Draw the samples at different stages of chilli processing • Check the efficiency of processing machine • Check the safety measures during processing • Inspect the presence of any un desirable material like - Hairs - Metals - Straws - Thread - Rubber band etc • Inspect the whole processing activity at regular intervals • Check the quality of under process chillies by analyzing the parameters such as - Moisture content - Color - Foreign matters - Aflatoxin level - Pungency - Fungal load etc	• Maintenance and cleanliness of processing machine • Efficiency assurance of processing machine • Chilli pods cleanliness before processing • Determine the ratio of different spices in different recipes • Removal of undesirable material during processing • Assurance of hygienic conditions in processing area • Inspection of whole processing activity

LU-4: Check and assure the quality of finished product	• Draw the random samples of finished product using appropriate procedure • Prepare representative and working sample • Label the sample to include the information like date of sampling, sampler name, chilli lot identity etc. • Perform the analytical tests on the samples of finished product such as - Moisture content - Color - Aflatoxin level - Pungency - Fungal load etc In addition to above mentioned test the trainee will also be capable to perform the test on processed whole chillies such as - Proportion of shrivelled pods - Foreign matters - Proportion of damaged pods • Handle the equipment to perform analytical tests for example - Weighing balance - ELIZA	• Impact of substandard packaging of processed chillies • Handling of substandard packed chillies • Description of substandard packed chillies - Damaged boxes - Improper sealing - Absence or misprinting of manufacturing dates, batch numbers, expiry dates etc. • Hygienic conditions of personnel and packaging area • Calibration of packaging machines • Proper stacking of packed material • Impact of proper transportation of packed material to the store • Storage management of the finished product

	- Incubator - Colony counter - Magnifying glass - Microscope etc • Examine the substandard packed chillies • Check the labelling details such as - Batch number - Manufacturing date - Expiry date - Retail price - Net weight - Company monogram etc.	• Safety measures during packaging
LU-5: Maintain the general laboratory standards	• Meet the requirements for specific tests. For example wear lab coat, gloves and mask during aflatoxin analysis • Use glassware including beaker, flask, pipette, cylinder etc carefully during test examination • Follow the precautionary measures for instrument handling; laboratory standards	• General Laboratory standards • ISO 17025 standards • Description of different glassware such as - Cylinder - Beaker - Flask

	etc. • Examine the laboratory conditions (like temperature, dust free etc.) required for equipment	- Pipette etc • Handling and keeping of glassware • General precautionary measures that should be taken care of while handling the sophisticated equipments • Impact of sub standard environmental conditions in proper handling of equipment and wrong interpretation of analytical results etc • Proper placement and procedures to keep the glassware and equipment accessories in the lab

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: Procurement of chillies of appropriate specification		
Learning Units	**Assessment methodology**	**Scheduled dates**
LU-1: Identify the appropriate lots of whole chillies for procurement from the market **LU-2:** Undertake the testing of offered lot or get the analysis done from authenticated lab **LU-3:** Select the chilli lot for procurement **LU-4:** Segregate the appropriate pods on the basis of their physical appearance **LU-5:** Manage the transportation of whole chillies to the factory		

Module 2: Store chillies in the ware house		
Learning Units	**Assessment methodology**	**Scheduled dates**
LU-1: Inspect and select the site/ware house for storage of whole chillies **LU-2:** Recognize the insect pest and their nature of damage during storage **LU-3:** Determine the dosage and method of application of fumigants **LU-4:** Store the chillies under proper conditions		

Module 3:Under take milling of chillies		
Learning Units	**Assessment methodology**	**Scheduled dates**
LU-1: Prepare the whole chillies for milling into powder **LU-2:** Check the milling unit and prepare the machine for milling **LU-3:** Undertake milling of whole chillies into powder of desired specification **LU-4:** Check and maintain the hygienic conditions during milling		

Module 4: Carryout packaging of processed chillies		
Learning Units	**Assessment methodology**	**Scheduled dates**
LU-1: Select the suitable packing material **LU-2:** Check and operate the packaging machine **LU-3:** Undertake packaging of processed chillies		

Module 5: Assure the maintenance of quality of chillies		
Learning Units	**Assessment Methodology**	**Scheduled dates**
LU-1: Check the quality of raw chillies **LU-2:** Check and assure the quality of stored chillies **LU-3:** Check and assure the quality of chillies during processing **LU-4:** Check and assure the quality of finished product **LU-5:** Maintain the general laboratory standards		

5. LIST OF TOOLS AND EQUIPMENTS

S. No.	Description	Quantity
1.	Sampler	03
2.	Portable moisture meter	03
3.	Triple beam balance	02
4.	Photographs of normal and damaged chilli pods (available in research reports)	20
5.	Aflatoxin meter	03
6.	Thermometer	05
7.	Nozzles	10
8.	Sprayer	05
9.	Sealer	03
10.	Petri dishes	
11.	Vernier calliper	05
12.	Record book	

13.	Standard weight	05
14.	Sample divider	03
15.	ELIZA Reader	02
16.	Moisture meter	02
17.	Stop watch	05
18.	Weighing machine	03
19.	Digital balance	02
20.	Microscope	02
21.	Mixer	03
22.	Trays	15
23.	Aflatoxin meter	03
24.	Colony counter	03
25.	Hand dryer	05

26.	Photograph of different storage insects	NA
27.	Milling unit	10
28.	Mechanical Tools such as screw driver, spanner, etc	02
29.	Calculator	10
30.	Humidity meter	03
31.	Packaging machine	
32.	Labelling machine	

6. LIST OF CONSUMABLES

- Varieties of chilli
- Sample collection bags
- Gloves
- Mask
- Tags
- bags
- Phosphine tablets
- Plastic sheet (PE sheets)
- Sample collection bags
- Magnifier glass (10)
- Petri plates
- Blotter paper
- Insect collecting vials
- Brush
- Pesticides
- First aid box
- Safety utilities
- Instructions charts
- Packaging material

- Aflatoxin kit
- PDA (Potato Dextrose Agar)
- Test tubes
- Duster
- Soap dispensers
- Tissue papers
- Stationery items e.g. pen, pencil, calculator etc.
- Hand sanitizer

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