



# National Vocational Certificate Level 2 in Agriculture (Chilli Processing)

Competency Standards



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# Competency Standards – Chilli Processing

## Module 1: Manage the procurement of chillies

**Overview:** These competency standards will ensure that the trainee is able to identify, select and procure suitable whole chilli lots for processing

Competency Unit	Performance Criteria	Knowledge and Understanding
<p><b>A1-</b> Identify the appropriate lots of whole chillies for procurement from the market</p>	<p><b>Trainee will be able to:</b></p> <p><b>P1.</b> Identify different varieties of chillies</p> <p><b>P2.</b> Recognize the sub types of chilli variety 'Dandi cut'</p> <p><b>P3.</b> Recognize hybrid varieties of chillies</p> <p><b>P4.</b> Calculate the proportion of different sub types of Dandi cut chillies within a chilli lot</p> <p><b>P5.</b> Distinguish between normal and damaged pods</p> <p><b>P6.</b> Identify shrivelled chilli pods</p> <p><b>P7.</b> Recognize the chillies that are fungal infested, physically damaged, discoloured etc.</p> <p><b>P8.</b> Calculate the proportion of normal pods in a lot</p> <p><b>P9.</b> Calculate the proportion of each type of damaged pods in a lot</p> <p><b>P10.</b> Calculate the cost analysis of chilli lot</p>	<p><b>Trainee will be able to:</b></p> <p><b>K1.</b> Explain the distinguished characteristics of major chilli varieties and its sub types</p> <p><b>K2.</b> Describe the following terms:</p> <ul style="list-style-type: none"> <li>• Hybrid varieties</li> <li>• Healthy pods/seeds</li> <li>• Damaged pods/seeds</li> <li>• Shrivelled pods</li> <li>• Discoloured pods</li> </ul> <p><b>K3.</b> Give reasons of procuring good quality chillies</p> <p><b>K4.</b> Estimate the proportion of healthy pods in the offered consignment</p> <p><b>K5.</b> Describe the importance of physical examination of chillies</p> <p><b>K6.</b> Explain the role of following factors in determining chilli quality:</p> <ul style="list-style-type: none"> <li>• Moisture</li> <li>• Aflatoxin</li> </ul>

	<p><b>P11.</b> Negotiate the price of selected chilli lot</p> <p><b>P12.</b> Identify different markets for chilli procurement</p> <p><b>P13.</b> Recognize the chilli variety which is preferred for processing</p>	<ul style="list-style-type: none"> <li>• Pods colour</li> <li>• Pungency</li> </ul> <p><b>K7.</b> Compare the permissible limits of aflatoxin in various countries and prevailing situation in Pakistan</p> <p><b>K8.</b> Give goods reasons of not to mix the damaged pods with healthier pods</p> <p><b>K9.</b> Exhibit salient features of chilli markets in Pakistan</p>
<p><b>A-2:</b> Undertake the testing of offered lot or get the analysis done from authenticated laboratory</p>	<p><b>P1.</b> Handle samplers</p> <p><b>P2.</b> Handle sample dividers in the market</p> <p><b>P3.</b> Draw the random samples using appropriate equipment and procedure</p> <p><b>P4.</b> Perform mixing and dividing of primary samples to prepare composite sample from primary samples</p> <p><b>P5.</b> Select the sampling bag</p> <p><b>P6.</b> Label the sample to include the information like date of sampling, sample collector name, chilli lot identity etc.</p> <p><b>P7.</b> Prepare representative samples</p> <p><b>P8.</b> Seal the sample to protect and preserve the sample</p> <p><b>P9.</b> Ascertain the quality of chilli pods offered for procurement by undertaking physical observation</p>	<p><b>K1.</b> Explain the characteristics of chilli variety that are important to know for processing</p> <p><b>K2.</b> Give introduction of different types of samplers and dividers</p> <p><b>K3.</b> Draw representative sample by random sampling</p> <p><b>K4.</b> Describe the Importance of randomized chilli sampling</p> <p><b>K5.</b> Select equipment required for sampling and explain their use</p> <p><b>K6.</b> Define basic requirements of chilli for processing</p> <p><b>K7.</b> Explain the important components of a chilli analysis report</p> <p><b>K8.</b> Evaluate the chilli analysis report</p> <p><b>K9.</b> Explain the importance of correct labelling</p> <p><b>K10.</b> Explain the requirement and importance of</p>

	<p>or examination</p> <p><b>P10.</b> Perform moisture test using portable moisture tester or get the moisture tested from laboratory</p> <p><b>P11.</b> Perform aflatoxin test using portable aflatoxin tester or get it analysed from laboratory</p> <p><b>P12.</b> Calculate the proportion of foreign matter in chilli lot</p> <p><b>P13.</b> Perform pungency test or get it tested from laboratory</p> <p><b>P14.</b> Perform colour test by visual examination or get it tested laboratory</p>	<p>sampling bags</p> <p><b>K11.</b> Describe the importance of storage of chilli samples to conserve moisture and other parameters</p> <p><b>K12.</b> Demonstrate the impact of physical observation during selection of lot</p> <p><b>K13.</b> Explain the following factors in determining chilli quality:</p> <ul style="list-style-type: none"> <li>• moisture content</li> <li>• aflatoxin</li> <li>• colour</li> <li>• pungency</li> </ul> <p><b>K14.</b> Elaborate separation of foreign material from selected lot</p>
<p><b>A-3:</b> Select the chilli lot for procurement</p>	<p><b>P1.</b> Determine the physical condition of chilli sample representing a specified chilli lot</p> <p><b>P2.</b> Determine the quality of chilli lot by evaluating test report</p> <p><b>P3.</b> Distinguish between good and poor chilli lot</p> <p><b>P4.</b> Compare different types of lots keeping in view the price structure</p> <p><b>P5.</b> Select the whole chilli lots on the basis of physical examination, analytical report and offered price</p> <p><b>P6.</b> Negotiate on the price</p>	<p><b>K1.</b> Explain the differentiating parameters between old and new crop</p> <p><b>K2.</b> Explain the impact of mixing of old and new crop</p> <p><b>K3.</b> Explain the identifying characteristics of good quality chillies</p> <p><b>K4.</b> Explain the basic requirement for the selection of good quality chillies</p> <p><b>K5.</b> Ascertain the trends of chilli market</p> <p><b>K6.</b> Distinguish between damaged and normal pods</p> <p><b>K7.</b> Explain the differentiating factors of pure and hybrid</p>

	<p><b>P7.</b> Avoid the mixing of good and bad quality chilli lots</p> <p><b>P8.</b> Decide suitable chilli lots for processing</p> <p><b>P9.</b> Procure good chilli lots that are normal in shape, size, colour, disease free, belongs to one variety etc. from reliable dealers/traders</p>	<p>chilli varieties</p> <p><b>K8.</b> Calculate the cost effectiveness of chilli lot at the time of selection</p> <p><b>K9.</b> List out the parameters of suitable chilli lot selection such as:</p> <ul style="list-style-type: none"> <li>- Proportion of damaged pods</li> <li>- Percentage of foreign matters</li> <li>- Colour</li> <li>- Pungency</li> <li>- Proportion of sub varieties</li> <li>- Offered price</li> <li>- Shrivelled pods</li> <li>- Moisture content</li> <li>- Aflatoxin levels</li> </ul>
<p><b>A-4:</b> Segregate the appropriate pods on the basis of their physical appearance</p>	<p><b>P1.</b> Differentiate between healthier and damaged pods</p> <p><b>P2.</b> Identify various types of damages including discoloration, shrivelling, immaturation etc.</p> <p><b>P3.</b> Recognize the extent of damaged in the chilli pods e.g. minor, moderate and severe.</p> <p><b>P4.</b> Identify the damaged pods that are required to be separated from the chilli lot</p> <p><b>P5.</b> Test the proportion of damaged pods by using appropriate test like visual analysis</p> <p><b>P6.</b> Separate damaged pods from chilli lot</p>	<p><b>K1.</b> Describe different types of damaged pods including</p> <ul style="list-style-type: none"> <li>- discoloured</li> <li>- immature</li> <li>- cracked</li> <li>- shrivelled</li> <li>- viscera bored</li> <li>- viscera opened</li> <li>- black spotted</li> <li>- fungal damaged</li> </ul> <p><b>K2.</b> Explain the determining of damaging extent in chilli pods</p> <p><b>K3.</b> Give classifying parameters of damaged pods i.e. minor, moderate and severely damaged pods</p>

	<p><b>P7.</b> Handle severely damaged chilli pods</p> <p><b>P8.</b> Identify the suitable pods for processing</p> <p><b>P9.</b> Segregate the sub types within Dandi cut based on physical characteristics</p> <p><b>P10.</b> Separate shrivelled chilli pods</p> <p><b>P11.</b> Separate infested chillies from the chilli lot</p>	<p><b>K4.</b> Elaborate the impact of minor, moderately and severely damaged pods on the overall quality of chilli lot</p> <p><b>K5.</b> Calculate of the percentage of minor, moderate and severe pods</p> <p><b>K6.</b> Describe different types of damaged pods that should be separated from chilli lot</p> <p><b>K7.</b> Explain procedures for segregating severely damaged pods</p> <p><b>K8.</b> Elaborate impact of appropriate/healthier/damaged pods on chilli processing</p> <p><b>K9.</b> Explain the physical characteristics of dandi cut variety</p> <p><b>K10.</b> Describe the procedure for handling of different types of damaged pods separated from lot</p>
<p><b>A-5:</b> Manage the transportation of whole chillies to the factory</p>	<p><b>P1.</b> Determine the suitability of transport to carry raw chillies</p> <p><b>P2.</b> Select suitable transport for chillies for transporting chillies from market to factory</p> <p><b>P3.</b> Negotiate with the transporter on price</p> <p><b>P4.</b> Supervise the loading of chillies on transport to avoid over filling, damaging etc.</p> <p><b>P5.</b> Transport chilli bags from market to factory</p> <ul style="list-style-type: none"> <li>• Calculate the cost effectiveness of transport</li> </ul>	<p><b>K1.</b> Describe the importance of transportation in chilli business and major requirements for transporting of chillies from market to factory</p> <p><b>K2.</b> Describe the impact of inappropriate transport on chilli quality</p> <p><b>K3.</b> Draw backs of over loading on chilli quality</p> <p><b>K4.</b> Calculate the cost effectiveness of transportation</p> <p><b>K5.</b> Explain transportation of chilli with precautionary measures during unfavourable weather</p>

	<ul style="list-style-type: none"> <li>• Determine the impact of improper transport on damage chilli during transportation</li> <li>• Handle the transportation during overcast conditions</li> </ul> <p><b>P6.</b> Supervise the unloading of chillies from transport to factory inlet</p> <p><b>P7.</b> Record keeping of procured chilli lot</p>	<p><b>K6.</b> Describe the maintenance of hygienic conditions of vehicle during transportation</p> <p><b>K7.</b> Describe the maintenance of record of selected chilli lot before transportation</p>
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**Module 2:** Store chillies in the factory area

**Overview:** These competency standards will ensure that the trainee is able to store chillies using suitable procedures for protection from insect pests and microbial attack in order to maintain quality

Competency Unit	Performance Criteria	Knowledge and Understanding
<p><b>B-1:</b> Inspect and select the site/ware house for storage of whole chillies</p>	<p><b>Trainee will be able to:</b></p> <p><b>P1.</b> Inspect the storage site to determine its suitability for the storage of chillies</p> <p><b>P2.</b> Check the site for insect and rodent pests</p> <p><b>P3.</b> Identify insect species inhabiting the store</p> <p><b>P4.</b> Identify type of rodents present in and around ware house</p> <p><b>P5.</b> Inspect the storage site for presence of fungi</p> <p><b>P6.</b> Inspect the storage site for proper ventilation</p> <p><b>P7.</b> Check that the storage area is suitable for fumigation</p> <p><b>P8.</b> Check the storage site for maintaining the humidity and temperature</p> <p><b>P9.</b> Measure the total storage area in meter<sup>3</sup></p> <p><b>P10.</b> Examine the storage conditions</p> <p><b>P11.</b> Calculate the feasibility of storage site</p>	<p><b>Trainee will be able to explain:</b></p> <p><b>K1.</b> Prerequisites of good storage management</p> <p><b>K2.</b> Factors effecting storage of chillies</p> <p><b>K3.</b> Impact of temperature, humidity, packing material etc. on seed viability and chilli quality during storage</p> <p><b>K4.</b> Maintenance of storage conditions viz. humidity, temperature etc. during storage period</p> <p><b>K5.</b> Types of storage</p> <p><b>K6.</b> Possible modes of storage</p> <p><b>K7.</b> Impact of storage fungi on chilli quality</p> <p><b>K8.</b> Calculation of storage area</p> <p><b>K9.</b> Frequency of fumigation during storage period</p>

<p><b>B-2:</b> Recognize the insect pest and their nature of damage during storage</p>	<p><b>P1.</b> Identify the insect pests of chillies</p> <p><b>P2.</b> Monitor the chilli lots for determining the level of insect activity</p> <p><b>P3.</b> Collect samples for insect identification and their comparative occurrence</p> <p><b>P4.</b> Identify the insect species that can affect the quality of chillies</p> <p><b>P5.</b> Identify the larvae of various insects</p> <p><b>P6.</b> Calculate the level of infestation of insects</p> <p><b>P7.</b> Determine the type of damage caused by particular insects</p> <p><b>P8.</b> Assess the mode of action of particular insect species</p> <p><b>P9.</b> Determine the economic threshold levels (ETL) for different insect pests</p>	<p><b>K1.</b> Types of insect pests</p> <p><b>K2.</b> Insect pests and their relationship with climatic factors</p> <p><b>K3.</b> Identification of various pest species</p> <p><b>K4.</b> Losses due to insect pest attack</p> <p><b>K5.</b> Insect pests of chillies and their timings of occurrence</p> <p><b>K6.</b> Role of insects as a vector of bacterial, viral and fungal diseases</p> <p><b>K7.</b> Developmental stages of insect pests</p> <p><b>K8.</b> Feeding sites of insects</p> <p><b>K9.</b> Sampling for detection of insects and their relative abundance</p> <p><b>K10.</b> Importance of economic threshold level (ETL) of different insect species</p> <p><b>K11.</b> Determining the timing of pesticide application keeping in view their ETL</p>
<p><b>B-3:</b> Determine the dosage and method of application of fumigants</p>	<p><b>P1.</b> Differentiate the types of insecticides or fumigants</p> <p><b>P2.</b> Select appropriate insecticides or fumigants</p> <p><b>P3.</b> Determine the frequency and interval of fumigation keeping in view infestation levels</p>	<p><b>K1.</b> Types of insecticides or fumigants and their use</p> <p><b>K2.</b> Mode of action of different types of insecticide and fumigants</p> <p><b>K3.</b> Differentiation between generic and branded pesticides</p>

	<p><b>P4.</b> Apply suitable pesticides to disinfect the storage site if required</p> <p><b>P5.</b> Apply the proper dosage of fumigants according to the capacity of ware house</p> <p><b>P6.</b> Take all necessary precautionary measures during and after fumigation</p>	<p><b>K4.</b> Determining the need of fumigant applications</p> <p><b>K5.</b> Timings and frequency of fumigation</p> <p><b>K6.</b> Procedures of applying fumigants</p> <p><b>K7.</b> Principles of safe application of fumigants</p> <p><b>K8.</b> Knowledge about precautionary measures for operators</p> <p><b>K9.</b> Determination of correct dose of fumigant for various types of godowns/stacks</p>
<p><b>B-4:</b> Store the chillies under proper conditions</p>	<p><b>P1.</b> Pack and tag the chilli lots for identification by recording details like date of entry, persons involved etc.</p> <p><b>P2.</b> Store chillies under suitable conditions to maintain its quality and wholesomeness by keeping them free from insects, rodents and microbial attack etc.</p> <p><b>P3.</b> Undertake periodic inspection of stores to ensure chilli quality</p> <p><b>P4.</b> Determine the fumigation requirements to arrest insect infestation during storage</p> <p><b>P5.</b> Undertake fumigate adopting suitable procedures for application of fumigants and taking the require safety measures</p> <p><b>P6.</b> Maintain the storage conditions unfavourable for growth and development of fungi and insects ensuring proper ventilation</p>	<p><b>K1.</b> Techniques used for storage of chillies for required duration</p> <p><b>K2.</b> Periodic Inspection of stores and produce</p> <p><b>K3.</b> Determination of the frequency of fumigation</p> <p><b>K4.</b> Procedure for undertaking fumigation of chillies</p> <p><b>K5.</b> Safety measures during fumigation</p> <p><b>K6.</b> Maintenance of optimum storage conditions like humidity, temperature etc.</p> <p><b>K7.</b> Record keeping for storage inventory and conditions</p> <p><b>K8.</b> Good storage management of chillies</p> <p><b>K9.</b> Storage capacity and its optimum utilization</p>

	<b>P7. Store chillies in suitable size stacks keeping in view the capacity of ware house</b>	
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**Module 3:** Manage the milling process

**Overview:** To undertake milling of chillies following appropriate procedure and hygienic conditions

Competency Unit	Performance Criteria	Knowledge and Understanding
<p><b>C-1:</b> Prepare the whole chillies for milling into powder</p>	<p><b>Trainee will be able to:</b></p> <p><b>P1.</b> Check and select the physical quality of chillies for pre milling process</p> <p><b>P2.</b> Separate the unwanted materials from the batch</p> <p><b>P3.</b> Select chilli lot prior to processing on the basis of following:</p> <ul style="list-style-type: none"> <li>- Aflatoxin</li> <li>- Moisture content</li> <li>- fungal load</li> <li>- pungency etc.</li> </ul> <p><b>P4.</b> Select the chilli type(s) by keeping in view the finished product</p> <p><b>P5.</b> Identify chilli lot for specific ultimate product</p> <p><b>P6.</b> Prepare whole chillies as per requirement of finished product like</p> <ul style="list-style-type: none"> <li>- Whole pods</li> <li>- Crushed pods</li> <li>- Chilli powder</li> <li>- Curry recipes</li> </ul> <p><b>P7.</b> Prepare whole chillies for milling in to crushed and powder</p>	<p><b>Trainee will be able to explain:</b></p> <p><b>K1.</b> Pre-requisites of chilli milling</p> <p><b>K2.</b> Cleaning the chilli pods before milling</p> <p><b>K3.</b> Importance of preparation of whole chillies before milling</p> <p><b>K4.</b> Milling procedure for whole chillies</p> <p><b>K5.</b> Separation of unwanted materials from the given chilli batch viz foreign material etc.</p> <p><b>K6.</b> Criteria of selecting chilli lot viz.</p> <ul style="list-style-type: none"> <li>- Aflatoxin</li> <li>- Moisture content</li> <li>- Fungal load</li> <li>- Pungency etc.</li> </ul> <p><b>K7.</b> Procedures of preparing whole chillies according to the finished product</p> <ul style="list-style-type: none"> <li>- Whole pods</li> <li>- Crushed pods</li> <li>- Chilli powder</li> <li>- Curry recipes</li> </ul> <p><b>K8.</b> Procedures of handling the whole chillies according</p>

	<b>P8.</b> Handle the chillies according to the type/variety	to the type/variety
<b>C-2:</b> Check the milling unit and prepare the machine for milling	<p><b>P1.</b> Adjust the rollers gap if and when required</p> <p><b>P2.</b> Perform pre-cleaning of milling machine</p> <p><b>P3.</b> Calibrate milling machine before processing</p> <p><b>P4.</b> Check the machine before running the batch</p> <p><b>P5.</b> Maintain the milling machine and accessories</p> <p><b>P6.</b> Perform post cleaning of milling line by adopting appropriate procedures</p> <p><b>P7.</b> Respond upon any type of emergency such as</p> <ul style="list-style-type: none"> <li>- Power failure</li> <li>- Accidents</li> <li>- Mechanical failure</li> <li>- Short circuit etc.</li> </ul> <p><b>P8.</b> Respond to the situation, processed material, milling machine etc., in case of emergencies</p> <p><b>P9.</b> Record the information related with machinery such as</p> <ul style="list-style-type: none"> <li>- date, time and person involved in cleaning</li> <li>- List of accessories</li> <li>- Date and time of emergency</li> <li>- Calibration date and done by whom</li> </ul> <p><b>P10.</b> Calculate the efficiency of milling machine</p>	<p><b>K1.</b> Knowledge about milling machine</p> <p><b>K2.</b> Different types of milling machines</p> <p><b>K3.</b> Inspection for the performance of milling machine</p> <p><b>K4.</b> Knowledge about the important components of machine before starting the milling process</p> <p><b>K5.</b> Calibration of milling machine</p> <p><b>K6.</b> Maintenance of milling machines</p> <p><b>K7.</b> Operation of milling machine</p> <p><b>K8.</b> Safety measures during operation</p> <p><b>K9.</b> Problems related to milling machine</p> <p><b>K10.</b> Causes of problems in milling machine</p> <p><b>K11.</b> Trouble shooting in milling machine</p> <p><b>K12.</b> Determination the efficiency of milling machine</p> <p><b>K13.</b> Milling machine requirements such as type of floor, area, ventilation etc.</p>

<p><b>C-3:</b> Undertake milling of whole chillies into powder of desired specification</p>	<p><b>P1.</b> Undertake milling of round shaped chillies</p> <p><b>P2.</b> Undertake milling of long shaped chillies</p> <p><b>P3.</b> Calculate the ratio of different varieties/types of chillies if required</p> <p><b>P4.</b> Adjust the proportion of different chilli varieties accordingly</p> <p><b>P5.</b> Undertake milling of whole chillies according to the end product viz.</p> <ul style="list-style-type: none"> <li>- Crushed pods</li> <li>- Chilli powder</li> <li>- Curry recipes</li> </ul> <p><b>P6.</b> Calculate the ratio of different spices for recipes mix</p> <p><b>P7.</b> Perform mixing of different spices when the recipe mix is desired</p> <p><b>P8.</b> Calculate milling yield in terms of powder collected after every batch</p> <p><b>P9.</b> Adopt safety and precautionary measures during milling</p> <p><b>P10.</b> Handle the substandard material properly</p>	<p><b>K1.</b> Importance of milling process of chillies</p> <p><b>K2.</b> Proper timing of milling</p> <p><b>K3.</b> Evaluation of milling process</p> <p><b>K4.</b> Different milling techniques for round and long shaped chillies</p> <p><b>K5.</b> Procedures of milling of whole chillies in to powder</p> <p><b>K6.</b> Calculation of milling yield</p> <p><b>K7.</b> Undertaking the mixing of spices when needed</p> <p><b>K8.</b> Calculation of different chilli types/varieties according to their characteristics (viz. pungency, colour etc.) and ultimate product</p> <p><b>K9.</b> Quality characteristics viz., colour and pungency of different chilli types/varieties</p> <p><b>K10.</b> Requirement of pungency and colour for different finished products viz. crushed pods, chilli powder and curry recipes</p> <p><b>K11.</b> Precautions during the process of milling</p>
<p><b>C-4:</b> Check and maintain the hygienic conditions during milling</p>	<p><b>P1.</b> Perform pre and post cleaning of milling line using appropriate materials/solvents and procedures</p> <p><b>P2.</b> Avoid unhygienic materials in and around the production area</p>	<p><b>K1.</b> Knowledge about the hygienic conditions during milling</p> <p><b>K2.</b> Importance of hygienic conditions during milling</p> <p><b>K3.</b> Sanitation of the production line</p>

	<p><b>P3.</b> Inspect the production area for hygienic conditions</p> <p><b>P4.</b> Maintain the hygienic conditions during the milling process</p> <p><b>P5.</b> Identify the conditions that are appropriate for milling</p> <p><b>P6.</b> Adopt safety measures for the operators and milling workers</p> <p><b>P7.</b> Check the hygienic status of operator/worker</p> <p><b>P8.</b> Handle the undesirable materials present in processing area</p> <p><b>P9.</b> Manage the instructions related to hygiene</p>	<p><b>K4.</b> Impact of unhygienic conditions on the quality of finished product</p> <p><b>K5.</b> Identification of conditions that are not appropriate for milling</p> <p><b>K6.</b> Difference between the precautionary and hygienic measures</p> <p><b>K7.</b> Procedure to inspect the hygienic conditions of milling line and area</p> <p><b>K8.</b> Procedure to check the hygienic status of operator and works</p> <p><b>K9.</b> Safety measures of personnel during milling process</p> <p><b>K10.</b> Hygienic requirements/standards for operators and workers</p> <p><b>K11.</b> Follow instructions related to hygiene whether in the form of signs or text</p>
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**Module 4:** Carryout packaging of processed chillies

**Overview:** These competency standards will ensure that the trainee will be able to pack the processed chillies including chilli powder using suitable packaging material

Competency Unit	Performance Criteria	Knowledge and Understanding
<p><b>D-1:</b> Select the suitable packing material</p>	<p><b>Trainee will be able to:</b></p> <p><b>P1.</b> Determine the quality of packaging material</p> <p><b>P2.</b> Identify/initiate procurement of appropriate packing material for processed chillies</p> <p><b>P3.</b> Decide appropriate packing material for processed chillies</p> <p><b>P4.</b> Procure the selected packaging material</p> <p><b>P5.</b> Avoid substandard materials for packaging</p> <p><b>P6.</b> Cost effectiveness of selected packaging materials</p> <p><b>P7.</b> Store the packaging materials properly</p> <p><b>P8.</b> Maintain and record the packaging materials</p> <p><b>P9.</b> Maintain the hygienic conditions</p>	<p><b>Trainee will be able to explain:</b></p> <p><b>K1.</b> The importance of packaging of processed chillies</p> <p><b>K2.</b> Different types of packaging materials</p> <p><b>K3.</b> Merits and demerits of various packing material</p> <p><b>K4.</b> Use of appropriate packing for processed chillies</p> <p><b>K5.</b> Differentiation between suitable or not suitable material</p> <p><b>K6.</b> Characteristics of material suitable for packaging</p> <p><b>K7.</b> Impact of usage of substandard packaging material on end product quality</p> <p><b>K8.</b> Maintenance of procurement record such as</p> <ul style="list-style-type: none"> <li>- Date of procurement</li> <li>- Source of procurement</li> <li>- Cost</li> <li>- Types of packaging materials</li> </ul> <p><b>K9.</b> Maintenance of storage conditions of packaging materials</p>

		<b>K 10.</b> Safe transportation of packaging materials from market to factory area
<b>D-2:</b> Check and operate the packaging machines	<p><b>P1.</b> Prepare the packaging machines and its accessories for operation using standard procedures</p> <p><b>P2.</b> Operate the packaging machines</p> <p><b>P3.</b> Calibrate the packaging machines with regular time interval</p> <p><b>P4.</b> Maintain the packaging machines regularly</p> <p><b>P5.</b> Check the machines before running the batch</p> <p><b>P6.</b> Adopt safety measures for operators and workers during packaging</p> <p><b>P7.</b> Perform pre and post cleaning of packaging machines following appropriate procedures</p> <p><b>P8.</b> Take action on any type of emergency during packaging process like electric shut down, any type of mishap with personnel and machine etc.</p> <p><b>P9.</b> Overcome the emergency situation, processed material, packaging machine etc.</p> <p><b>P10.</b> Record the related information with machinery such as - Date, time and person involved in cleaning</p> <ul style="list-style-type: none"> <li>- List of accessories</li> <li>- Date and time of emergency</li> <li>- Calibration date and person</li> </ul>	<p><b>K1.</b> Knowledge about packaging machine</p> <p><b>K2.</b> Different types of packaging machines</p> <p><b>K3.</b> Operation of packaging machine</p> <p><b>K4.</b> Safety measures during packaging operation</p> <p><b>K5.</b> Inspection for the performance of packaging machines</p> <p><b>K6.</b> Knowledge about the important components of machines before starting the packaging process</p> <p><b>K7.</b> Calibration of packaging machines</p> <p><b>K8.</b> Maintenance of packaging machines</p> <p><b>K9.</b> Problems related to packaging machines</p> <p><b>K10.</b> Causes of problems</p> <p><b>K11.</b> Basic trouble shooting in packaging machines</p> <p><b>K12.</b> Determination of efficiency of packaging machines</p> <p><b>K13.</b> Packaging machines requirements such as hygiene, area, ventilation etc.</p>

	<b>P11.</b> Calculate the efficiency of packaging machine	
<b>D-3:</b> Undertake packaging of processed chillies	<p><b>P1.</b> Pack the processed chillies including</p> <ul style="list-style-type: none"> <li>- chilli powder</li> <li>- crushed chillies</li> <li>- mix recipes</li> <li>- whole pods</li> </ul> <p><b>P2.</b> Identify the substandard packed chillies</p> <p><b>P3.</b> Separate substandard packed chillies</p> <p><b>P4.</b> Handle the substandard packed chillies</p> <p><b>P5.</b> Check and maintain the personnel hygiene in packaging area</p> <p><b>P6.</b> Maintain and calibrate the metal detector</p> <p><b>P7.</b> Handle undesirable material detected by metal detector</p> <p><b>P8.</b> Segregate and label different chilli lots carefully</p> <p><b>P9.</b> Check the labelling details such as</p> <ul style="list-style-type: none"> <li>- Batch number</li> <li>- Manufacturing date</li> <li>- Expiry date</li> <li>- Retail price</li> <li>- Net weight</li> <li>- Company monogram etc.</li> </ul>	<p><b>K1.</b> Knowledge about chilli packaging</p> <p><b>K2.</b> Importance of packaging</p> <p><b>K3.</b> Importance of tagging/labelling for identification</p> <p><b>K4.</b> Impact of substandard packaging of processed chillies</p> <p><b>K5.</b> Handling of substandard packed chillies</p> <p><b>K6.</b> Description of substandard packed chillies</p> <ul style="list-style-type: none"> <li>- Damaged boxes</li> <li>- Improper sealing</li> <li>- Absence or misprinting of manufacturing dates, batch numbers, and expiry dates etc.</li> </ul> <p><b>K7.</b> Hygienic condition of personnel and packaging area</p> <p><b>K8.</b> Calibration of packaging machines</p> <p><b>K9.</b> Inspection of weight after completion of packaging</p> <p><b>K10.</b> Proper stacking of packed material</p> <p><b>K11.</b> Importance of properly shifting the packed material to the store</p> <p><b>K12.</b> Knowledge about the maintaining the proper storage condition in accordance to the finished product requirement</p>

	<p><b>P10.</b> Shift the packed and processed material with care</p> <p><b>P11.</b> Store the packed and processed material at the properly maintained store before marketing</p> <p><b>P12.</b> Maintain the hygienic condition of ware house for processed material</p>	<p><b>K13.</b> Storage of packed material</p> <p><b>K14.</b> Need for maintaining the hygienic conditions of store for storage of packed material</p> <p><b>K15.</b> Difference between storage of exportable packed chillies and chillies intended for local consumption</p> <p><b>K16.</b> Safety measures during packaging</p>
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**Module 5:** Assure the processing of good quality chillies

**Overview:** These competency standards will ensure that the trainee will be able to assure the maintenance of the quality of chillies before, during and after processing

Competency Unit	Performance Criteria	Knowledge and Understanding
<p><b>E-1:</b> Check the quality of raw chillies</p>	<p><b>Trainee will be able to:</b></p> <p><b>P1.</b> Handle samplers</p> <p><b>P2.</b> Handle sample dividers</p> <p><b>P3.</b> Draw the random samples using appropriate equipment and procedure from the vehicle loaded with chilli bags</p> <p><b>P4.</b> Perform mixing and dividing of primary samples to prepare a composite sample</p> <p><b>P5.</b> Prepare representative and working sample from composite sample</p> <p><b>P6.</b> Label the sample to include the information like date of sampling, sampler name, chilli lot identity etc.</p> <p><b>P7.</b> Seal the sample to intact the condition of sample</p> <p><b>P8.</b> Place the samples properly in laboratory</p> <p><b>P9.</b> Perform the analytical tests such as</p> <ul style="list-style-type: none"> <li>- Moisture content</li> <li>- Colour</li> </ul>	<p><b>Trainee will be able to explain:</b></p> <p><b>K1.</b> Types of samplers</p> <p><b>K2.</b> Handling of samplers</p> <p><b>K3.</b> Techniques of sampling</p> <p><b>K4.</b> Preparation of different types of samples like</p> <ul style="list-style-type: none"> <li>- Random samples</li> <li>- Composite samples</li> <li>- Sub samples</li> <li>- Working samples</li> </ul> <p><b>K5.</b> Impact of proper labelling</p> <p><b>K6.</b> Procedure of sampling</p> <p><b>K7.</b> Determination of moisture content</p> <p><b>K8.</b> Determination of aflatoxin level</p> <p><b>K9.</b> Determination of pungency</p> <p><b>K10.</b> Separation of foreign matters</p> <p><b>K11.</b> Detection of fungal load</p>

	<ul style="list-style-type: none"> <li>- Proportion of damages</li> <li>- Shrivelled pods</li> <li>- Foreign matters</li> <li>- Aflatoxin level</li> <li>- Pungency</li> <li>- Fungal load etc.</li> </ul> <p><b>P10.</b> Handle the equipment to perform analytical tests</p> <p><b>P11.</b> Report the results of analytical tests to the immediate and other concerned personnel or departments</p> <p><b>P12.</b> Interpret the results</p>	<p><b>K12.</b> Description of analytical equipment</p> <p><b>K13.</b> Operational procedures for analytical equipment</p> <p><b>K14.</b> Quality characteristics of raw chillies for processing in to a specific type of finished products</p> <p><b>K15.</b> Maintaining the equipment</p>
<p><b>E-2:</b> Check and assure the quality of stored chillies</p>	<p><b>P1.</b> Optimize the storage condition at factory level like</p> <ul style="list-style-type: none"> <li>- Temperature</li> <li>- Humidity</li> <li>- Ventilation etc.</li> </ul> <p><b>P2.</b> Maintain the storage condition</p> <p><b>P3.</b> Draw the random samples of stored chillies using appropriate equipment and procedure from the factory store.</p> <p><b>P4.</b> Prepare the composite sample from primary samples</p> <p><b>P5.</b> Make representative and working sample from composite sample</p> <p><b>P6.</b> Label the storage samples properly</p>	<p><b>K1.</b> Optimization of storage conditions</p> <p><b>K2.</b> Maintenance of storage conditions like temperature, ventilation, humidity etc.</p> <p><b>K3.</b> Different procedures of sampling</p> <p><b>K4.</b> Use of appropriate equipment for sampling</p> <p><b>K5.</b> Drawing, preparation, mixing and sub division of different samples such as primary sample, composite sample, representative sample and working sample</p> <p><b>K6.</b> Labelling the sample appropriately</p> <p><b>K7.</b> Assurance of quality parameters</p> <p><b>K8.</b> Maintenance of record of each sample at the time of storage</p>

	<p><b>P7.</b> Determine the frequency of sampling to assure the proper storage</p> <p><b>P8.</b> Handle the raw and processed chillies under storage for quality assurance</p> <p><b>P9.</b> Check the quality of stored chillies by analysing the parameters such as</p> <ul style="list-style-type: none"> <li>- Moisture content</li> <li>- Colour</li> <li>- Proportion of damages</li> <li>- Shrivelled pods</li> <li>- Foreign matters</li> <li>- Aflatoxin level</li> <li>- Pungency</li> <li>- Fungal load etc.</li> </ul> <p><b>P9.</b> Maintain and assure the traceability of each sample during storage</p> <p><b>P10.</b> Maintain the record of quality assurance of stored chillies</p> <p><b>P11.</b> Report the results to the concerned departments and also able to intimate in case of unusual results</p>	
<p><b>E-3:</b> Check and assure the quality of chillies during processing</p>	<p><b>P1.</b> Draw the samples at different stages of chilli processing</p> <p><b>P2.</b> Maintain the cleanliness of processing machines after every batch</p> <p><b>P3.</b> Check and assure the efficiency of processing machine</p>	<p><b>K1.</b> Maintenance and cleanliness of processing machine</p> <p><b>K2.</b> Efficiency assurance of processing machine</p> <p><b>K3.</b> Assurance of chilli pods cleanliness before processing</p> <p><b>K4.</b> Assuring the ratio of different spices in different recipes</p>

	<p><b>P4.</b> Assure the cleanliness of chilli pods before processing</p> <p><b>P5.</b> Check the safety measures during processing</p> <p><b>P6.</b> Inspect the presence of any un desirable material like</p> <ul style="list-style-type: none"> <li>• Hairs</li> <li>• Metals</li> <li>• Straws</li> <li>• Thread</li> <li>• Rubber band etc.</li> </ul> <p><b>P7.</b> Check and maintain the hygienic conditions of workers in processing area</p> <p><b>P8.</b> Determine the frequency of sampling</p> <p><b>P9.</b> Inspect the whole processing activity at regular intervals</p> <p><b>P10.</b> Check the quality of under process chillies by analysing the parameters such as</p> <ul style="list-style-type: none"> <li>- Moisture content</li> <li>- Colour</li> <li>- Foreign matters</li> <li>- Aflatoxin level</li> <li>- Pungency</li> <li>- Fungal load etc.</li> </ul> <p><b>P11.</b> Report the results to the concerned departments</p>	<p><b>K5.</b> Inspection of safety measures</p> <p><b>K6.</b> Removal of undesirable materials during processing</p> <p><b>K7.</b> Assurance of hygienic condition at processing area</p> <p><b>K8.</b> Inspection of whole processing activity</p>
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	<b>P12. Respond at unexpected results</b>	
<b>E-4: Check and assure the quality of finished product</b>	<p><b>P1.</b> Draw the random samples of finished product using appropriate procedures</p> <p><b>P2.</b> Prepare representative and working sample</p> <p><b>P3.</b> Label the sample to include the information like date of sampling, sampler name, chilli lot identity etc.</p> <p><b>P4.</b> Perform the analytical tests on the samples of finished product such as</p> <ul style="list-style-type: none"> <li>- Moisture content</li> <li>- Colour</li> <li>- Aflatoxin level</li> <li>- Pungency</li> <li>- Fungal load etc.</li> </ul> <p><b>P5.</b> In addition to above mentioned test the trainee will also be capable to perform the test on processed whole chillies such as</p> <ul style="list-style-type: none"> <li>- Proportion of shrivelled pods</li> <li>- Foreign matters</li> <li>- Proportion of damaged pods</li> </ul> <p><b>P6.</b> Handle the equipment to perform analytical tests such as</p> <ul style="list-style-type: none"> <li>- Weighing balance</li> <li>- ELISA</li> <li>- Incubator</li> <li>- Colony counter</li> <li>- Magnifying glass</li> </ul>	<p><b>K1.</b> Knowledge about packaging of chillies</p> <p><b>K2.</b> Importance of packaging</p> <p><b>K3.</b> Tagging/labelling of seeds for identification</p> <p><b>K4.</b> Impact of substandard packaging of processed chillies</p> <p><b>K5.</b> Handling of substandard packed chillies</p> <p><b>K6.</b> Description of substandard packaging chillies</p> <ul style="list-style-type: none"> <li>- Damaged boxes</li> <li>- Improper sealing</li> <li>- Absence or misprinting of manufacturing dates, batch numbers, and expiry dates etc.</li> </ul> <p><b>K7.</b> Hygienic condition of personnel and packaging area</p> <p><b>K8.</b> Calibration of packaging machines</p> <p><b>K9.</b> Checking and inspection of weight on completion of packaging</p> <p><b>K10.</b> Proper stacking of packed material</p> <p><b>K11.</b> Importance of proper shifting of packed material to the store</p> <p><b>K12.</b> Storage requirements of the finished product</p>

	<p>Microscope etc.</p> <p><b>P7.</b> Examine the proper sealing and packaging of finished product</p> <p><b>P8.</b> Examine the substandard packed chillies</p> <p><b>P9.</b> Examine the personnel hygiene of workers in packaging area</p> <p><b>P10.</b> Maintain and calibrate the metal detector</p> <p><b>P11.</b> Handle undesirable material detected by metal detector</p> <p><b>P12.</b> Segregate and label different chilli lots carefully</p> <p><b>P13.</b> Check the labelling details such as</p> <ul style="list-style-type: none"> <li>- Batch number</li> <li>- Manufacturing date</li> <li>- Expiry date</li> <li>- Retail price</li> <li>- Net weight</li> <li>- Company monogram etc.</li> </ul> <p><b>P14.</b> Shift the packed and processed material with care</p> <p><b>P15.</b> Storage of packed and processed materials before marketing</p> <p><b>P16.</b> Maintaining the hygienic conditions of stores for processed material</p>	<p><b>K13.</b> Storage of packed material</p> <p><b>K14.</b> Importance of keeping the hygienic conditions of packed materials store</p> <p><b>K15.</b> Difference between storage of exportable packed chillies and chillies intended for local marketing</p> <p><b>K16.</b> Safety measures during packaging</p>
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<p><b>E-5:</b> Maintain the general laboratory standards</p>	<p><b>P1.</b> Avoid following</p> <ul style="list-style-type: none"> <li>- Smoking</li> <li>- Eating</li> <li>- Drinking</li> </ul> <p><b>P2.</b> Avoid gathering of unauthorized persons in laboratory</p> <p><b>P3.</b> Prepare and maintain the record of followings</p> <ul style="list-style-type: none"> <li>- Chemicals</li> <li>- Equipment</li> <li>- Accessories</li> <li>- Calibration</li> <li>- Test reports</li> </ul> <p><b>P4.</b> Meet the requirements during specific tests. For example wear lab coat, gloves and mask during aflatoxin analysis</p> <p><b>P5.</b> Assist the main analyst</p> <p><b>P6.</b> Keep the glassware including beaker, flask, pipette, cylinder etc. carefully</p> <p><b>P7.</b> Use glassware where needed</p> <p><b>P8.</b> Follow the precautionary measures for instrument handling</p> <p><b>P9.</b> Keep the operational and maintenance manuals of equipment in a proper place</p> <p><b>P10.</b> Maintain the conditions of laboratory (like temperature, dust free etc.) required for equipment</p>	<p><b>K1.</b> General Laboratory standards</p> <p><b>K2.</b> ISO 17025 standards</p> <p><b>K3.</b> Description of different glassware such as</p> <ul style="list-style-type: none"> <li>- Cylinder</li> <li>- Beaker</li> <li>- Flask</li> <li>- Pipette etc.</li> </ul> <p><b>K4.</b> Handling and keeping of glassware</p> <p><b>K5.</b> General precautionary measures that must be kept in mind while handling the sophisticated equipment</p> <p><b>K6.</b> Laboratory conditions to be maintained for proper functioning of equipment</p> <p><b>K7.</b> Impact of smoking on the laboratory functioning</p> <p><b>K8.</b> Impact of usual habits that are restricted in laboratory on the analytical work and results</p> <p><b>K9.</b> Impact of substandard environmental conditions on the equipment performance, analytical results and others</p> <p><b>K10.</b> Proper placement and procedure for glassware and equipment accessories in the lab</p>
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## 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	

## 1. 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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