



**NATIONAL COMPETENCY STANDARDS  
FOR  
AGRICULTURIST  
(MUSHROOM FARMING)**

**Department of Occupational Standards  
Ministry of Labour and Human Resources  
Thimphu, Bhutan.**





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## FOREWORD

The Department of Occupational Standards of the Ministry of Labour and Human Resources proudly presents the National Competency Standards (NCS) for Agriculturist (mushroom farming) as a major initiative for improving the quality of Vocational Education and Training System in Bhutan. These standards represent the fruits of hard work and invaluable experiences gained by the department since its establishment in the latter half of 2003. The main aim of developing National Competency Standards is to set up a well defined nationally recognized Vocational Qualification and Certification system that will help set a benchmark for the Vocational Education and Training (VET) System in our country aligned to international best practices.

National Competency Standards is one of the base pillars in the Bhutan Vocational Qualification Framework (BVQF) and is the first step in its implementation. The standards are developed to ensure that employees or vocational graduates possess and acquire the desired skills, knowledge and attitude required by industries and employers. In order to ensure this close match in supply and demand of skills, knowledge and attitude, standards have been developed in close consultation and partnership with industry experts and validated by the Technical Advisory Committees for the concerned economic sectors.

A vocational education and training system based on National Competency Standards shall ensure that delivered training is of a high quality and relevant to the needs of the labour market. As a result, future TVET graduates will be better equipped to meet the need and expectations of industries and employers. This positive impact on the employability of TVET graduates will enhance the reputation of technical vocational education and training and make it attractive to school leavers.

While acknowledging the existing level of cooperation and collaboration, the ministry earnestly requests employers and training providers to extend the fullest support and cooperation in implementing the National Competency Standards. The ultimate objective is to build a competent and productive national workforce that will contribute to the continued socio-economic progress of our country.

I gratefully acknowledge the valuable contributions made by experts from industries during the consultation, verification and validation processes of the standards. I look forward to improved engagement and active

participation of the industry and employers in the development of a quality assured demand driven VET system in the near future.

I firmly believe we can sacrifice a bit today for a better tomorrow.

Dorji Wangdi

**Minister**

Ministry of Labour and Human Resources

## **INTRODUCTION**

### **A. National Competency Standards (NCS)**

National Competency Standards specify the skill, knowledge and attitudes applied to a particular occupation. Standards also specify the standards or criteria of performance of a competent worker and the various contexts in which work may take place. Standards provide explicit advice to assessors regarding the skill and knowledge to be demonstrated by candidates seeking formal recognition either following training or through work experience.

### **Purpose of National Competency Standards**

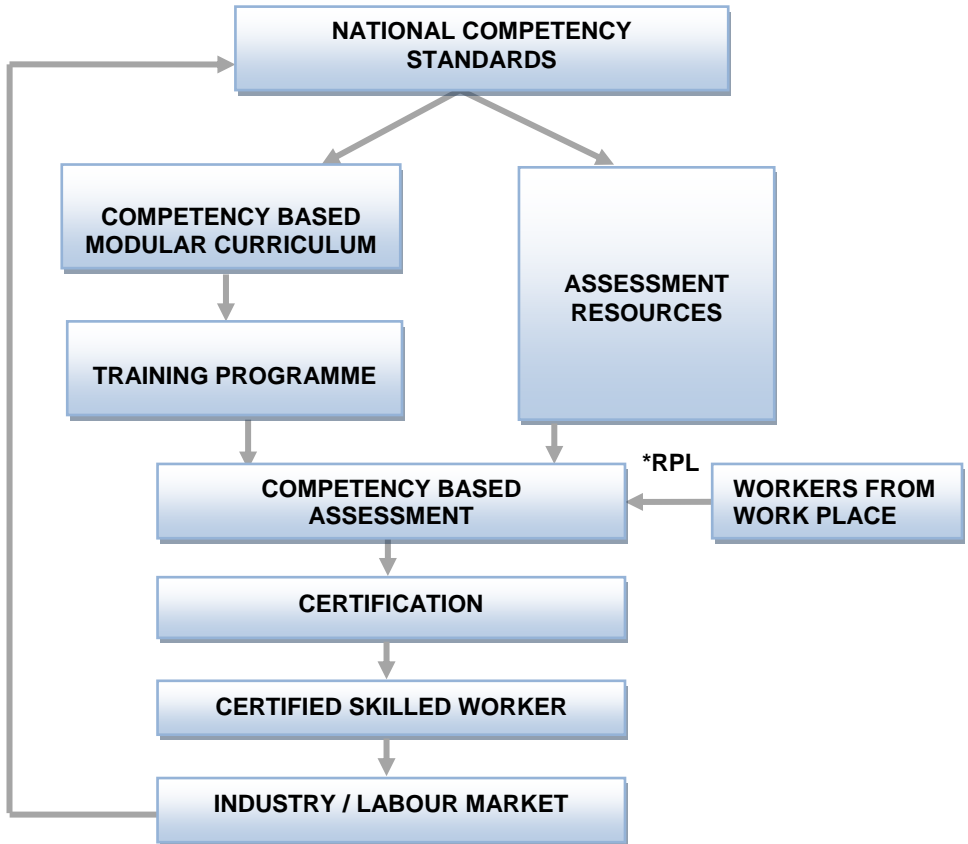
National Competency Standards serve a number of purposes including:

- Provides advice to curriculum developers about the skill and knowledge to be included in curriculum.
- Provides specifications to assessment resource developers about the skill, knowledge and attitudes within an occupation to be demonstrated by candidates.
- Provides advice to industry/employers about job functions, which in turn can be used for the development of job descriptions, performance appraisal systems and work flow analysis.

## B. Bhutan Vocational Qualification Framework (BVQF)

Bhutan Vocational Qualifications Framework is an agreed system of Assessing, Certifying and Monitoring nationally recognized qualifications for all learning in the TVET sector against national standards, in training institutions, in the workplace, in schools or anywhere where learning takes place.

### Components of the Bhutan Vocational Qualification Framework (BVQF)



\* RPL = Recognition of Prior Learning



## BVQF Levels

The Bhutan Vocational Qualification Framework has three levels classified based on the competency of the skilled workers. The three levels are:

- National Certificate Level 3 (NC III)
- National Certificate Level 2 (NC II)
- National Certificate Level 1 (NC I)

## BVQF Level Descriptors

The qualification levels are decided based on level descriptors. The detail of the qualification level descriptor is as follows:

### National Certificate Level 1

<b>Carry out processes that:</b>	<b>Learning demand:</b>	<b>Responsibilities which are applied:</b>
<ul style="list-style-type: none"><li>• Are narrow in range.</li><li>• Are established and familiar.</li><li>• Offer a clear choice of routine responses.</li><li>• Involve some prioritizing of tasks from known solutions.</li></ul>	<ul style="list-style-type: none"><li>• Basic operational knowledge and skill.</li><li>• Utilization of basic available information.</li><li>• Known solutions to familiar problems.</li><li>• Little generation of new ideas.</li></ul>	<ul style="list-style-type: none"><li>• In directed activity.</li><li>• Under general supervision and quality control.</li><li>• With some responsibility for quantity and quality.</li><li>• With no responsibility for guiding others.</li></ul>

## National Certificate Level 2

Carry out processes that:	Learning demand:	Responsibilities which are applied:
<ul style="list-style-type: none"> <li>• Require a range of well developed skills.</li> <li>• Offer a significant choice of procedures requiring prioritisation.</li> <li>• Are employed within a range of familiar context.</li> </ul>	<ul style="list-style-type: none"> <li>• Some relevant theoretical knowledge.</li> <li>• Interpretation of available information.</li> <li>• Discretion and judgement.</li> <li>• A range of known responses to familiar problems</li> </ul>	<ul style="list-style-type: none"> <li>• In directed activity with some autonomy.</li> <li>• Under general supervision and quality checking.</li> <li>• With significant responsibility for the quantity and quality of output.</li> <li>• With some possible responsibility for the output of others.</li> </ul>

## National Certificate Level 3

Carry out processes that:	Learning demand:	Responsibilities which are applied:
<ul style="list-style-type: none"> <li>• Requires a wide range of technical or scholastic skills.</li> <li>• Offer a considerable choice of procedures requiring prioritization to achieve optimum outcomes.</li> <li>• Are employed in a variety of familiar and unfamiliar contexts.</li> </ul>	<ul style="list-style-type: none"> <li>• A broad knowledge base which incorporates some theoretical concepts.</li> <li>• Analytical interpretation of information.</li> <li>• Informed judgement.</li> <li>• A range of sometimes innovative responses to concrete but often unfamiliar problems.</li> </ul>	<ul style="list-style-type: none"> <li>• In self-directed activity.</li> <li>• Under broad guidance and evaluation.</li> <li>• With complete responsibility for quantity and quality of output.</li> <li>• With possible responsibility for the output of others.</li> </ul>

## **PURPOSE**

This suite of one qualification is designed for people interested in a career as agriculturist (mushroom farming). The National Certificate in the mentioned trade comprises of four units that cover all the essential knowledge and skills required for people working as skilled agriculturist (vegetable farming).

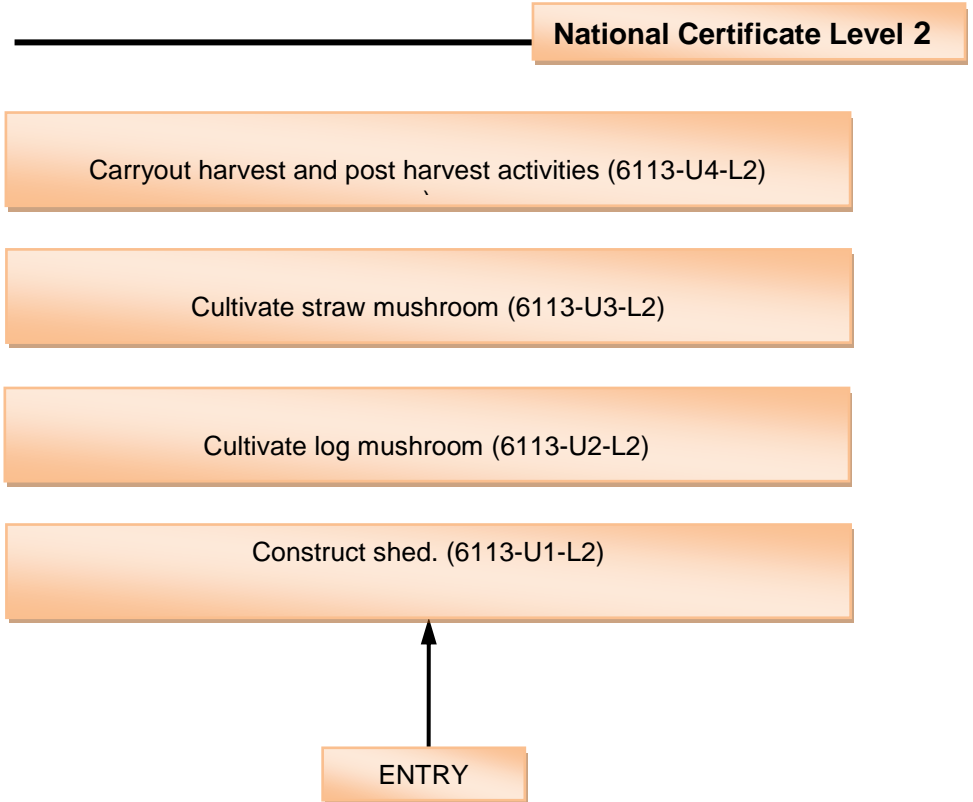
The units covered are;

1. Construct shed
2. Cultivate log mushroom
3. Cultivate straw mushroom
4. Carry out harvesting and post harvesting activities

Successful completion of this qualification is a pre requisite for entry into Level 3 qualification if there is any.

## PACKAGING OF QUALIFICATIONS FOR AGRICULTURIST (MUSHROOM FARMING)

The National Competency Standards for the agriculturist (mushroom farming) comprises of four units. They form one qualification levels as shown below:



## **CODING USED FOR NATIONAL COMPETENCY STANDARDS**

The coding and classification system developed in Bhutan is logical, easy to use, and also aligned with international best practises. The Bhutanese coding and classification system is based on the International Standard Classification of Occupations, 2008 (ISCO-08) developed by the International Labour Organisation (ILO).

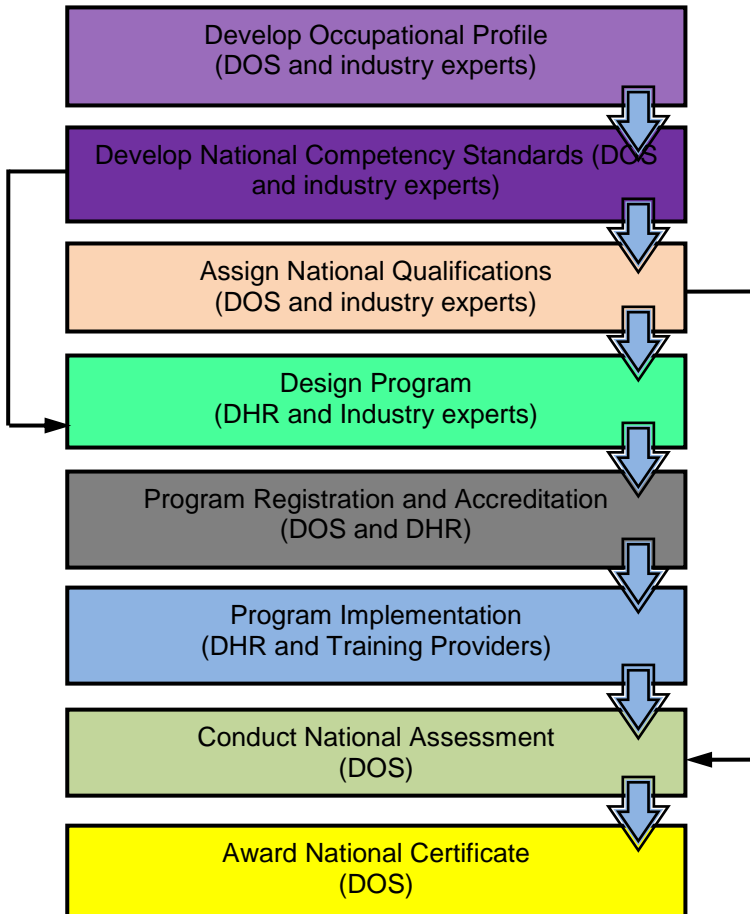
The coding of the national competency standards forms the basis of the identification code for the Vocational Education and Training Management Information System (VET – MIS) both in terms of economic sector identification and that of the individual standard.

Coding the individual unit of competency standard is to identify the level where qualification package belongs.

While packaging, in order to follow a logical order, only national competency standards related to each other and following a logical sequence in terms of training delivery, from the simple to the complex are clustered into a qualification packages.

The ILO assigns the code 6113 to the occupation, mushroom growers and related trades. Therefore in Bhutan, the occupation agriculturist (mushroom farming) has been assigned the code 6113 in the national coding system. The units are assigned the code U while the Levels are assigned the code L. Therefore the code for the National Certificate Level 2 will be 6113 - U1 - L2.

# Implementation and operational procedures for National Competency Standard (NCS)



**Key:**

MoLHR – Ministry of Labour and Human Resources

DHR – Department of Human Resources

DOS – Department of Occupational Standards

## **NATIONAL COMPETENCY STANDARDS FOR AGRICULTURIST (MUSHROOM FARMING)**

### **Subject experts involved during the consultative workshop for Agriculturist (Vegetable farming):**

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Construct shed	<ol style="list-style-type: none"><li>1. Prepare for work</li><li>2. Construct shed</li></ol>	
Cultivate log mushroom	<ol style="list-style-type: none"><li>1. Prepare for work</li><li>2. Prepare Log (drilling)</li><li>3. Inoculation and waxing</li><li>4. Nurture the billet</li><li>5. Cropping</li></ol>	
Cultivate straw mushroom	<ol style="list-style-type: none"><li>1. Prepare for work</li><li>2. Prepare straw</li><li>3. Carry out spawning</li><li>4. Incubate the substrate block</li><li>5. Carry out cropping</li></ol>	
Carryout harvest and post harvest activities.	<ol style="list-style-type: none"><li>1. Harvest</li><li>2. Post - Harvest</li></ol>	



**UNIT TITLE** : **Construct shed**

**DESCRIPTOR** : This unit covers the competencies required to prepare for work and to construct the shed.

**CODE** : **6113-U1-L2**

ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Prepare for work.	1.1 Select and use required <b>tools and equipment</b> as per the job requirements. 1.2 Select and use required <b>materials</b> as per the job requirements.
2. Construct shed.	2.1 Select the site as per the job requirements. 2.2 Prepare materials as per the job requirements. 2.3 Fix and lay materials as per the job requirements. 2.4 Construct mini tank as per the standard size. 2.5 Lay roofing materials / wall materials as per the job requirements. 2.6 Lay stone / cement flooring as per the job requirements. 2.7 Ensure proper ventilation and lighting of the shed as per the standards practices.

RANGE STATEMENT
<p><b>Tools and equipment may include but not limited to:</b></p> <ul style="list-style-type: none"> <li>• Knife</li> <li>• Crow bar</li> </ul>

<ul style="list-style-type: none"> <li>• Saw</li> </ul>	<ul style="list-style-type: none"> <li>• Axe</li> </ul>
<p><b>Materials may include but not limited to:</b></p> <ul style="list-style-type: none"> <li>• Pole</li> <li>• Bamboo mat</li> <li>• Cement</li> <li>• Stone</li> <li>• Nail</li> <li>• Pipe</li> </ul>	
<p><b>Personal Protective equipment (PPE) may include but not limited to:</b></p> <ul style="list-style-type: none"> <li>• Gloves</li> <li>• Dust mask</li> <li>• Working dress</li> </ul>	
<p><b>Seeds included are limited to:</b></p> <ul style="list-style-type: none"> <li>• Open pollinated seeds</li> <li>• Local seeds</li> <li>• Hybrid seeds</li> <li>•</li> </ul>	
<p><b>Pest and disease may include but not limited to:</b></p> <ul style="list-style-type: none"> <li>• Fungal disease</li> <li>• Bacterial disease</li> <li>• Nematodes</li> <li>• Termites</li> <li>• Cut worm</li> <li>• Aphids</li> </ul>	

<p><b>ASSESSMENT GUIDE</b></p>
<p><b>Form of assessment</b></p> <ul style="list-style-type: none"> <li>• Continuous assessment together with collected evidence of performance will be used.</li> <li>• Evidence of the performance shall be based on practical demonstration.</li> <li>• Knowledge can be assessed through written form of assessment.</li> </ul>

**Assessment context**

- Competency may be assessed in the actual work place or in a simulated workplace setting.

**Assessment condition**

- The candidate shall have access to all required tools, equipment, materials and documents.
- The candidate must complete the assessment in an accepted time frame.

**Critical aspects**

- Demonstrate compliance with Occupational Health and Safety Regulations applicable to work site operation.
- Ensure proper ventilation and lighting of the shed as per the standards practices.

<b>UNDERPINNING KNOWLEDGE</b>	<b>UNDERPINNING SKILLS</b>
<ul style="list-style-type: none"><li>• First Aids</li><li>• Estimation and costing</li><li>• Types of soil</li><li>• Farm economics</li><li>• Tools and equipment</li></ul>	<ul style="list-style-type: none"><li>• Communication skill</li><li>• Team work</li><li>• Planning</li><li>• Problem solving skills</li><li>• Decision making skills</li><li>• Handling of tools and equipment</li></ul>

**UNIT TITLE** : **Cultivate log mushroom**

**DESCRIPTOR** : This unit covers the competencies required to prepare for work, prepare bed/land and plant seedlings.

**CODE** : **6112-U2-L2**

<b>ELEMENTS OF COMPETENCE</b>	<b>PERFORMANCE CRITERIA</b>
1. Prepare for work.	1.1 Select and use required <b>tools and equipment</b> as per the job requirements. 1.2 Select and use required <b>materials</b> as per the job requirements. 1.3 Select and use required <b>PPE</b> as per the job requirements.
2. Prepare log for drilling.	2.1 Cut the logs to required size as per the job requirements. 2.2 Clean the cut logs following standard practices. 2.3 Drill the logs to required depth maintaining spacing as per the standard practices.
3. Inoculate and apply wax.	3.1 Inoculate the spawn as per the standard practices. 3.2 Mix wax and rosin mixture following standard mixing ratios as per the standard

	<p>practices.</p> <p>3.3 Boil the wax and rosin mixture to required temperature as per the standard practices</p> <p>3.4 Apply the wax, where necessary following standard procedures.</p> <p>3.5 Incubate the billet as per standard procedures.</p>
4. Nature the billet.	<p>4.1 Change the positions at required time interval following standard practices.</p> <p>4.2 Moisture the billet as and when necessary as per the job requirements.</p> <p>4.3 Check the growth of mycelium and take necessary action as per the job requirements.</p> <p>4.4 Soak the billet at required time duration following standard procedures.</p> <p>4.5 Incubate the billet following standard procedures.</p> <p>4.6 Check and ensure unnecessary growth of fungus and pest infestation and take necessary action as per the job requirements.</p>
5. Carry out cropping.	<p>5.1 Remove the plastic following standard procedures.</p> <p>5.2 Stack the billet for productions as per the standard procedures.</p> <p>5.3 Water the billet as per the standard procedures.</p> <p>5.4 Re-crop the billet after every resting period following standard procedures.</p>

## RANGE STATEMENT

**Tools and equipment may include but not limited to**

- Injector
- Driller
- Knife
- Power chain
- Axe
- Saw

**Materials may include but not limited to:**

- Wax
- Rosin
- Spawn
- Tin

**Personal Protective Equipment (PPE) may include but not limited to:**

- Gloves
- Mask
- Working dress
- Helmet

**ASSESSMENT GUIDE**

**Form of assessment**

- Continuous assessment together with collected evidence of performance will be used.
- Evidence of the performance shall be based on practical demonstration.
- Knowledge can be assessed through written form of assessment.

**Assessment context**

- Competency may be assessed in the actual work place or in a simulated workplace setting.

**Assessment condition**

- The candidate shall have access to all required tools, equipment, materials and documents.
- The candidate must complete the assessment in an accepted time

frame.

**Critical aspects**

- Demonstrate compliance with Occupational Health and Safety Regulations applicable to work site operation.
- Check and ensure unnecessary growth of fungus and pest infestation and take necessary action as per the job requirements.

<b>UNDERPINNING KNOWLEDGE</b>	<b>UNDERPINNING SKILLS</b>
<ul style="list-style-type: none"><li>• Occupational Health and Safety (OHS) Regulations</li><li>• First Aid</li><li>• Types mushroom</li><li>• Pest and diseases of mushroom</li><li>• Tree species</li><li>• Log cutting seasons</li><li>• Costing and estimation</li><li>• Cropping methods</li></ul>	<ul style="list-style-type: none"><li>• Communication skill</li><li>• Team work</li><li>• Planning</li><li>• Problem solving skills</li><li>• Decision making skills</li></ul>

**UNIT TITLE** : **Cultivate straw mushroom**

**DESCRIPTOR** : This unit covers the competencies required to weed, hoe, plant fertilization, irrigate, prune, train and to control pest and disease.

**CODE** : **6113-U3-L2**

<b>ELEMENTS OF COMPETENCE</b>	<b>PERFORMANCE CRITERIA</b>
1. Prepare for work.	1.1 Select and use required <b>materials</b> (as per the job requirements). 1.2 Select and use required <b>tool</b> as per the job requirements.
2. Prepare straw.	2.1 Cut the straw to required size as per the job requirements. 2.2 Soak the straw in water for required time duration as per the standard practices. 2.3 Steam the straw and rice brand for require time duration as per the standard practices. 2.4 Mix the straw and rice brand to required mixing ratio following standard procedures.



<p>3. Carry out spawning.</p>	<p>3.1 Cool the substrate to required temperature as per the standard practices.</p> <p>3.2 Fill the wooden box with substrate and inoculate spawn in alternative sequence to required tightness following standard procedures.</p>
<p>4. Incubate the substrate block.</p>	<p>4.1 Incubate the substrate block for required time duration as per standard procedures.</p> <p>4.2 Moisture the substrate block if necessary as per the job requirements.</p> <p>4.3 Check and ensure the unnecessary growth of fungus and pest infestation and take necessary action as per the job requirements.</p>
<p>5. Carryout cropping.</p>	<p>5.1 Remove the plastic following standard procedures.</p> <p>5.2 Water the substrate block as per the standard procedures.</p> <p>5.3 Re-crop the substrate block after every resting period following standard procedures.</p>

### RANGE STATEMENT

**Materials may include but not limited to:**

- Spawn
- Straw
- Empty drum
- Wooden box
- Plastic sheet
- Rice brand
- Lime

**Tool may include but not limited to:**

- knife

## ASSESSMENT GUIDE

### Form of assessment

- Continuous assessment together with collected evidence of performance will be used.
- Evidence of the performance shall be based on practical demonstration.
- Knowledge can be assessed through written form of assessment.

### Assessment context

- Competency may be assessed in the actual work place or in a simulated workplace setting.

### Assessment condition

- The candidate shall have access to all required tools, equipment, materials and documents.
- The candidate must complete the assessment in an accepted time frame.

### Critical aspects

- Demonstrate compliance with Occupational Health and Safety Regulations applicable to work site operation.
- Check and ensure the unnecessary growth of fungus and pest infestation and take necessary action as per the job requirements.

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> <li>• Occupational Health and Safety (OHS) Regulations</li> <li>• First Aid</li> <li>• Types mushroom</li> <li>• Pest and diseases of</li> </ul>	<ul style="list-style-type: none"> <li>• Communication skill</li> <li>• Team work</li> <li>• Planning</li> <li>• People handling skills</li> </ul>

mushroom <ul style="list-style-type: none"> <li>• Different Straw materials</li> <li>• Costing and estimation</li> <li>• Cropping methods</li> </ul>	<ul style="list-style-type: none"> <li>• Problem solving skills</li> <li>• Decision making skills</li> <li>• Handling tools and equipments</li> </ul>
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**UNIT TITLE** : **Carry out harvest and post- harvest activities**

**DESCRIPTOR** : This unit covers the competencies required to harvest and post harvest the product.

**CODE** : **6113-U4-L2**

ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Harvest the product.	1.1 Select and use required <b>materials</b> (tray, basket) as per the job requirements 1.2 Check the maturity size as per the standard practices. 1.3 Harvest marketable products following correct procedures
2. Carry out the post harvest activities.	2.1 Sort the products as per standard practices. 2.2 Clean products as per the standard practices. 2.3 Grade the products as per the standard procedures.

	2.4	Dry the product if necessary as per the job requirements
	2.5	Pack and label the products as per the standard practices.

## RANGE STATEMENT

**Materials may include but not limited to:**

- Tray
- Basket

## ASSESSMENT GUIDE

### Form of assessment

- Continuous assessment together with collected evidence of performance will be used.
- Evidence of the performance shall be based on practical demonstration.
- Knowledge can be assessed through written form of assessment.

### Assessment context

- Competency may be assessed in the actual work place or in a simulated workplace setting.

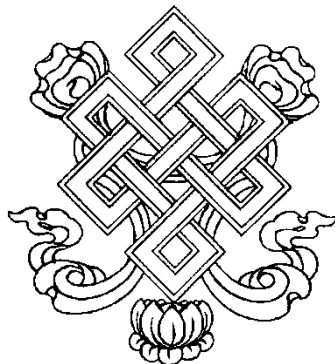
### Assessment condition

- The candidate shall have access to all required tools, equipment, materials and documents.
- The candidate must complete the assessment in an accepted time frame.

### Critical aspects

- Demonstrate compliance with Occupational Health and Safety Regulations applicable to work site operation.
- Check the maturity size as per the standard practices.

<b>UNDERPINNING KNOWLEDGE</b>	<b>UNDERPINNING SKILLS</b>
<ul style="list-style-type: none"><li>• Occupational Health and Safety (OHS) Regulations</li><li>• First Aid</li><li>• Types mushroom</li><li>• Pest and diseases of mushroom</li><li>• Costing and estimation</li><li>• Cropping methods</li></ul>	<ul style="list-style-type: none"><li>• Communication skill</li><li>• Team work</li><li>• Planning</li><li>• Problem solving skills</li><li>• Decision making skills</li><li>• Negotiation</li><li>• Handling of tools and equipments</li></ul>



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