



# Model Curriculum

**QP Name: Makhana Grower cum Processor**

**Options: Processing/ Products Preparation**

**QP Code: AGR/Q0306**

**Version: 2.0**

**NSQF Level: 4**

**Model Curriculum Version: 1.0**

Agriculture Skill Council of India || Agriculture Skill Council of India (ASCI), 6th Floor, GNG Tower, Plot  
No. 10, Sector - 44

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## Training Parameters

<b>Sector</b>	Agriculture
<b>Sub-Sector</b>	Agriculture Crop Production
<b>Occupation</b>	Fruit Crops Cultivation
<b>Country</b>	India
<b>NSQF Level</b>	4
<b>Aligned to NCO/ISCO/ISIC Code</b>	NCO-2015/NIL
<b>Minimum Educational Qualification and Experience</b>	12th grade pass OR 10th grade pass with 2 years of relevant experience OR 10th grade pass and pursuing continuous schooling OR Previous relevant qualification of NSQF Level 3.0 with minimum education as 8th grade pass with 3 years of relevant experience OR Previous relevant qualification of NSQF Level 3.5 with 1.5 years of relevant experience
<b>Pre-Requisite License or Training</b>	NA
<b>Minimum Job Entry Age</b>	18 Years
<b>Last Reviewed On</b>	29/03/2023
<b>Next Review Date</b>	29/03/2026
<b>NSQC Approval Date</b>	29/03/2023
<b>QP Version</b>	2.0
<b>Model Curriculum Creation Date</b>	29/03/2023
<b>Model Curriculum Valid Up to Date</b>	29/03/2026
<b>Model Curriculum Version</b>	1.0
<b>Minimum Duration of the Course</b>	390 Hours
<b>Maximum Duration of the Course</b>	420 Hours

## Program Overview

This section summarizes the end objectives of the program along with its duration.

### Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills to:

- Explain the criteria of selecting site, procuring makhana seeds and raising seedlings in the nursery.
- Demonstrate the process of cultivating makhana in water body and field.
- Demonstrate the process of harvesting and performing post-harvest management of makhana seeds.
- Demonstrate various practices to ensure health and safety at work.
- Demonstrate the process of processing makhana seeds and prepare makhana products.

### Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
<b>Bridge Module</b>	<b>05:00</b>	<b>00:00</b>	<b>0:00</b>	<b>00:00</b>	<b>05:00</b>
Module 1: Introduction to the role of a Makhana Grower cum Processor	05:00	00:00	0:00	00:00	05:00
<b>AGR/N0327: Select site, procure makhana seeds and raise seedlings in the nursery</b> <b>NOS Version- 2.0</b> <b>NSQF Level- 4</b>	<b>30:00</b>	<b>55:00</b>	<b>0:00</b>	<b>00:00</b>	<b>85:00</b>
Module 2: Process of selecting site, procuring makhana seeds and raising seedlings in the nursery	30:00	55:00	0:00	00:00	85:00
<b>AGR/N0328: Cultivate makhana in water body and field</b> <b>NOS Version- 2.0</b> <b>NSQF Level- 4</b>	<b>55:00</b>	<b>35:00</b>	<b>0:00</b>	<b>00:00</b>	<b>90:00</b>
Module 3: Process of cultivating makhana in water body and field	55:00	35:00	0:00	00:00	90:00
<b>AGR/N0329: Harvest and perform post-harvest</b>	<b>25:00</b>	<b>65:00</b>	<b>0:00</b>	<b>00:00</b>	<b>90:00</b>

<b>management of makhana seeds</b> <b>NOS Version- 2.0</b> <b>NSQF Level- 4</b>					
Module 4: Process of harvesting and performing post-harvest management of makhana seeds	25:00	65:00	0:00	00:00	90:00
<b>AGR/N9903 Maintain health and safety at the workplace</b> <b>NOS Version- 3.0</b> <b>NSQF Level- 4</b>	<b>05:00</b>	<b>25:00</b>	<b>0:00</b>	<b>00:00</b>	<b>30:00</b>
Module 5: Hygiene and cleanliness	02:00	10:00	0:00	00:00	12:00
Module 6: Safety and emergency procedures	03:00	15:00	0:00	00:00	18:00
<b>DGT/VSQ/N0102: Employability Skills (60 Hours)</b> <b>NOS Version- 1.0</b> <b>NSQF Level- 4</b>	<b>60:00</b>	<b>00:00</b>	<b>0:00</b>	<b>00:00</b>	<b>60:00</b>
Module 7: Employability Skills	60:00	00:00	0:00	00:00	60:00
<b>Total Duration</b>	<b>180:00</b>	<b>180:00</b>	<b>0:00</b>	<b>00:00</b>	<b>360:00</b>
<b>OJT: 30 Hours</b>					

## Optional Modules

The table lists the modules and their duration corresponding to the Optional NOS of the QP.

### Optional 1: Processing/ Products Preparation

<b>NOS and Module Details</b>	<b>Theory Duration</b>	<b>Practical Duration</b>	<b>On-the-Job Training Duration (Mandatory)</b>	<b>On-the-Job Training Duration (Recommended)</b>	<b>Total Duration</b>
<b>AGR/N0330: Process makhana seeds and prepare makhana products</b> <b>NOS Version- 2.0</b> <b>NSQF Level- 4</b>	<b>15:00</b>	<b>15:00</b>	<b>0:00</b>	<b>00:00</b>	<b>30:00</b>
Module 8: Processing makhana seeds and preparing makhana products	15:00	15:00	0:00	00:00	30:00
<b>Total Duration</b>	<b>15:00</b>	<b>15:00</b>	<b>0:00</b>	<b>00:00</b>	<b>30:00</b>

# Module Details

## Module 1: Introduction to the role of a Makhana Grower cum Processor

### Bridge Module

#### Terminal Outcomes:

- Discuss the job role of a Makhana Grower cum Processor.

<b>Duration: 05:00</b>	<b>Duration: 0:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Describe the size and scope of the agriculture industry and its sub-sectors.</li> <li>• Discuss the role and responsibilities of a Makhana Grower cum Processor.</li> <li>• Identify various employment opportunities for a Makhana Grower cum Processor.</li> </ul>	
<b>Classroom Aids</b>	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films	
<b>Tools, Equipment and Other Requirements</b>	
NA	

## Module 2: Process of selecting site, procuring makhana seeds and raising seedlings in the nursery

*Mapped to AGR/N0327 v2.0*

### Terminal Outcomes:

- Explain the criteria of selecting the site and procuring makhana seeds.
- Describe the process of raising makhana seedlings in the nursery.

<b>Duration: 30:00</b>	<b>Duration: 55:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• State different types of stagnant perennial water bodies suitable for makhana cultivation, such as ponds, land depressions, oxbow lakes, swamps and ditches.</li> <li>• Explain the nutritional and medicinal properties of makhana and its various uses.</li> <li>• State the duration and yield of different varieties of makhana.</li> <li>• Explain the benefits of carrying out field-based production of makhana.</li> <li>• Elucidate the agro-climatic conditions suitable for makhana cultivation.</li> <li>• Explain the criteria for selecting a land or water body for makhana cultivation.</li> <li>• List various inputs required for makhana cultivation.</li> <li>• Explain the importance of procuring high-yielding, pests and disease-resistant planting material from reliable sources.</li> <li>• List the required tools, implements and equipment required for makhana cultivation.</li> <li>• Elucidate the appropriate seed treatment method for treating makhana seeds.</li> <li>• State the appropriate conditions required for storing makhana seeds before being sown.</li> <li>• Explain the use of appropriate Personal Protective Equipment (PPE) during nursery operations.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate the process of treating the makhana seeds following the recommended seed treatment method.</li> <li>• Prepare a sample layout of the nursery.</li> <li>• Show how to remove any debris, weeds and waste materials from the identified land.</li> <li>• Demonstrate the process of carrying out deep ploughing in the field selected for the nursery using the appropriate machinery to implements.</li> <li>• Demonstrate how to apply and incorporate the recommended organic and inorganic fertilizers thoroughly in the field.</li> <li>• Show how to puddle the field, filling it with water to the recommended level.</li> <li>• Show how to broadcast the appropriate quantity of makhana seeds in the nursery field at the recommended seed rate.</li> <li>• Demonstrate the process of applying the recommended fertilizers in the nursery to ensure optimum growth of seedlings.</li> <li>• Show how to remove weeds from the nursery.</li> <li>• Demonstrate how to check the maturity of seedlings for transplanting, and harvest them ensuring no damage.</li> </ul>

- List the recommended organic and inorganic fertilizers to be used during nursery cultivation of makhana seedlings.
- Elucidate the recommended measures to be followed to protect makhana seedlings from pests and diseases.
- Discuss the relevant weed management practices.
- Explain the maturity indices of makhana seedlings for transplanting.
- Describe the process of harvesting makhana seedlings and storing them under the appropriate conditions.

#### **Classroom Aids**

Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop

#### **Tools, Equipment and Other Requirements**

Irrigation Equipment, Rubber gloves, Respiratory Masks/ Snorkel, Safety Shoes, Neem Cake, Makhana Gravity Separation Machine, Seed Washer (Capacity 100 Kg / hr Continuous Type), Urea, Zinc

## Module 3: Process of cultivating makhana in water body and field

### Mapped to ARG/N0328 v2.0

#### Terminal Outcomes:

- Explain the process of preparing the water body and broadcasting makhana seeds.
- Describe the process of preparing the field and transplanting makhana seedlings.
- Describe the process of performing nutrient, integrated pest and disease management.
- Explain the process of performing irrigation and weed management.

<b>Duration: 55:00</b>	<b>Duration: 35:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Describe the process of preparing the water body for makhana cultivation.</li> <li>• State the recommended seed rate for broadcasting makhana seeds in a water body.</li> <li>• Describe the process of scooping out makhana seeds from the water body and using them for starting a new crop.</li> <li>• Elucidate the benefits and process of liming a water body.</li> <li>• Describe the process of preparing a field for makhana cultivation, i.e. ploughing, fertilizer application, levelling and puddling the field.</li> <li>• State the recommended spacing requirement between makhana seedlings for their healthy growth.</li> <li>• Explain how to prepare different types of organic fertilizers.</li> <li>• State the nutrient requirement of the makhana crop.</li> <li>• Elucidate the benefits and process of intercropping.</li> <li>• List the common pests and diseases that affect the makhana crop.</li> <li>• List the signs of pest and disease infestation in the makhana crop.</li> <li>• Discuss the integrated pest and disease management practices for the makhana crop.</li> <li>• Explain the use of relevant plant protection equipment.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate the process of carrying out appropriate repair and maintenance in the pond.</li> <li>• Show how to sweep the floor of the water body already under makhana cultivation, using the appropriate tools and implements and scoop out the sunken seeds.</li> <li>• Show how to clean the selected water body using the appropriate tools and implements.</li> <li>• Show how to create piles of the scooped-out seeds in the water body using the relevant tools and implements.</li> <li>• Demonstrate how to broadcast the recommended quantity of makhana seeds according to the size of the selected water body when starting makhana cultivation in a new water body.</li> <li>• Demonstrate the process of applying the recommended organic and inorganic fertilizers in the water body.</li> <li>• Show how to check the pH level of the water in the water body using a pH meter and carry out liming to achieve the optimum pH levels.</li> <li>• Demonstrate the process of carrying out deep ploughing in the main field for an appropriate number of times.</li> <li>• Demonstrate the process of applying the recommended quantity of organic and inorganic fertilizers in the field in</li> </ul>

- Explain the importance of maintaining the recommended water levels in the field/ water body throughout the makhana cultivation period.
- Explain the signs of water quality deterioration in the makhana cultivation water body and the appropriate treatment to be applied to improve water quality.
- Explain how to control weed infestation during makhana cultivation.
- Elucidate the use of herbicides/bio-herbicides and appropriate weeding tools and implements.

incorporate them thoroughly.

- Demonstrate the process of carrying out levelling in the field using the appropriate tools and implements.
- Show how to create bunds in the field to the recommended suitable height and compact them.
- Demonstrate the process of transplanting seedlings in the field during the recommended months, ensuring no damage to them.
- Show how to remove the dead and diseased seedlings and replace them with healthy ones.
- Demonstrate how to prepare organic fertilizers such as Farmyard Manure (FYM), vermicompost, manure, etc.
- Demonstrate the process of applying the organic and inorganic fertilizers in the makhana production water body/ field in an appropriate quantity.
- Show how to remove the diseased and pest-infested parts of makhana plants to prevent the spread of pests and disease to the healthy vines.
- Demonstrate the process of applying the recommended treatment, such as pesticides and bio-pesticides like neem seed kernel extract as per the prescription to makhana plants to remove pests and diseases.
- Demonstrate the use of the appropriate plant protection equipment for applying pesticides.
- Prepare a sample record of the use of pesticides.
- Show how to remove waste material and debris from the water body regularly.
- Show how to remove weeds using the appropriate tools and implements.
- Demonstrate the process of preparing the recommended herbicide/ bio-herbicide solution suitable for the makhana crop.

	<ul style="list-style-type: none"> <li>• Demonstrate the process of applying herbicides/ bio-herbicides safely in the recommended dose using the appropriate equipment.</li> </ul>
<p><b>Classroom Aids</b></p>	
<p>Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop</p>	
<p><b>Tools, Equipment and Other Requirements</b></p>	
<p>Fawda, Makhana First Roasting machine, Makhana Popping Machine, Dryer with (Capacity 100 Kg/hr Continuous Type), Makhana Seed Size Grading Machine (CHALNI), Makhana Raw Seed</p>	

## Module 4: Process of harvesting and performing post-harvest management of makhana seeds

*Mapped to AGR/N0329 v2.0*

### Terminal Outcomes:

- Demonstrate the process of harvesting makhana.
- Explain the process of performing post-harvest management.

<b>Duration: 25:00</b>	<b>Duration: 65:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Explain the maturity indices of makhana seeds.</li> <li>• Describe the process of harvesting makhana seeds from a water body/field and the use of relevant tools and implements.</li> <li>• Explain the appropriate safety precautions to be taken while collecting makhana seeds from a water body.</li> <li>• Describe the process of cleaning and drying the harvested makhana seeds.</li> <li>• State the appropriate conditions for storing dry makhana seeds.</li> <li>• Explain the parameters applicable to grading makhana seeds and the use of different types of sieves for the purpose.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate the use of the diving gear to collect makhana seeds from the bottom of water bodies.</li> <li>• Demonstrate the use of the relevant Personal Protective Equipment (PPE) while collecting makhana to ensure protection from infections and other hazards.</li> <li>• Show how to clean the harvested makhana crop with clean water and shake them using the appropriate equipment for further cleaning.</li> <li>• Demonstrate the process of packing dry makhana in the appropriate packing material.</li> </ul>
<b>Classroom Aids</b>	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
<b>Tools, Equipment and Other Requirements</b>	
Compost, DAP, Potash, Automatic Form Fill Sealing Machine, Khurpi, Knapsack Sprayer, Ventury, Cotton Bags, Seeds of different Crops	

## Module 5: Hygiene and cleanliness

*Mapped to NOS AGR/N9903 v3.0*

### Terminal Outcomes:

- Discuss how to adhere to personal hygiene practices.
- Demonstrate ways to ensure cleanliness around the workplace.

<b>Duration: 02:00</b>	<b>Duration: 10:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Explain the requirements of personal health, hygiene and fitness at work.</li> <li>• Describe common health-related guidelines laid down by the organizations/ Government at the workplace</li> <li>• Explain the importance of good housekeeping at the workplace.</li> <li>• Explain the importance of informing the designated authority on personal health issues related to injuries and infectious diseases.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate personal hygiene practices to be followed at the workplace.</li> <li>• Demonstrate the correct way of washing hands using soap and water, and alcohol-based hand rubs.</li> <li>• Demonstrate the steps to follow to put on and take off a mask safely.</li> <li>• Show how to sanitize and disinfect one's work area regularly.</li> <li>• Demonstrate adherence to the workplace sanitization norms.</li> <li>• Show how to ensure the cleanliness of the work area.</li> </ul>
<b>Classroom Aids:</b>	
Computer, Projection Equipment, PowerPoint Presentation and Software, Facilitator's Guide, Participant's Handbook.	
<b>Tools, Equipment and Other Requirements</b>	
Personal Protective Equipment, Cleaning Equipment and Materials, Sanitizer, Soap, Mask	

## Module 6: Safety and emergency procedures

### Mapped to NOS AGR/N9903 v3.0

#### Terminal Outcomes:

- Describe how to adhere to safety guidelines.
- Show how to administer appropriate emergency procedures.

<b>Duration: 03:00</b>	<b>Duration: 15:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• List the Personal Protective Equipment (PPE) required at the workplace.</li> <li>• Describe the commonly reported hazards at the workplace.</li> <li>• Describe the hazards caused due to chemicals/pesticides/fumigants.</li> <li>• Describe the basic safety checks to be done before the operation of any equipment/machinery.</li> <li>• Describe the common first aid procedures to be followed in case of emergencies.</li> <li>• State measures that can be taken to prevent accidents and damage s at the workplace.</li> <li>• Explain the importance of reporting details of first aid administered, to the reporting officer/doctor, in accordance with workplace procedures</li> <li>• State common health and safety guidelines to be followed at the workplace.</li> </ul>	<ul style="list-style-type: none"> <li>• Check various areas of the workplace for leakages, water-logging, pests, fire, etc.</li> <li>• Demonstrate how to safely use the PPE and implement it as applicable to the workplace.</li> <li>• Display the correct way of donning, doffing and discarding PPE such as face masks, hand gloves, face shields, PPE suits, etc.</li> <li>• Sanitize the tools, equipment and machinery properly.</li> <li>• Demonstrate the safe disposal of waste.</li> <li>• Demonstrate procedures for dealing with accidents, fires and emergencies.</li> <li>• Demonstrate emergency procedures to the given workplace requirements.</li> <li>• Demonstrate the use of emergency equipment in accordance with manufacturers' specifications and workplace requirements.</li> <li>• Demonstrate the administration of first aid.</li> <li>• Prepare a list of relevant hotline/emergency numbers</li> </ul>
<b>Classroom Aids:</b>	
Computer, Projection Equipment, PowerPoint Presentation and Software, Facilitator's Guide, Participant's Handbook.	
<b>Tools, Equipment and Other Requirements</b>	
Personal Protective Equipment, First Aid Kit, Equipment used in Medical Emergencies.	

## Module 7: Employability Skills

*Mapped to NOS DGT/VSQ/N0102 v1.0*

**Duration: 60:00**

### Key Learning Outcomes

#### **Introduction to Employability Skills Duration: 1.5 Hours**

After completing this programme, participants will be able to:

1. Discuss the Employability Skills required for jobs in various industries
2. List different learning and employability related GOI and private portals and their usage

#### **Constitutional values - Citizenship Duration: 1.5 Hours**

3. Explain the constitutional values, including civic rights and duties, citizenship, responsibility towards society and personal values and ethics such as honesty, integrity, caring and respecting others that are required to become a responsible citizen
4. Show how to practice different environmentally sustainable practices.

#### **Becoming a Professional in the 21st Century Duration: 2.5 Hours**

5. Discuss importance of relevant 21st century skills.
6. Exhibit 21st century skills like Self-Awareness, Behavior Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life.
7. Describe the benefits of continuous learning.

#### **Basic English Skills Duration: 10 Hours**

8. Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone
9. Read and interpret text written in basic English
10. Write a short note/paragraph / letter/e -mail using basic English

#### **Career Development & Goal Setting Duration: 2 Hours**

11. Create a career development plan with well-defined short- and long-term goals

#### **Communication Skills Duration: 5 Hours**

12. Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette.
13. Explain the importance of active listening for effective communication
14. Discuss the significance of working collaboratively with others in a team

#### **Diversity & Inclusion Duration: 2.5 Hours**

15. Demonstrate how to behave, communicate, and conduct oneself appropriately with all genders and PwD
16. Discuss the significance of escalating sexual harassment issues as per POSH act.

#### **Financial and Legal Literacy Duration: 5 Hours**

17. Outline the importance of selecting the right financial institution, product, and service
18. Demonstrate how to carry out offline and online financial transactions, safely and securely
19. List the common components of salary and compute income, expenditure, taxes, investments etc.
20. Discuss the legal rights, laws, and aids

#### **Essential Digital Skills Duration: 10 Hours**

21. Describe the role of digital technology in today's life
22. Demonstrate how to operate digital devices and use the associated applications and features, safely and securely
23. Discuss the significance of displaying responsible online behavior while browsing, using various social media platforms, e-mails, etc., safely and securely
24. Create sample word documents, excel sheets and presentations using basic features
25. utilize virtual collaboration tools to work effectively

**Entrepreneurship Duration: 7 Hours**

26. Explain the types of entrepreneurship and enterprises
27. Discuss how to identify opportunities for potential business, sources of funding and associated financial and legal risks with its mitigation plan
28. Describe the 4Ps of Marketing-Product, Price, Place and Promotion and apply them as per requirement
29. Create a sample business plan, for the selected business opportunity

**Customer Service Duration: 5 Hours**

30. Describe the significance of analyzing different types and needs of customers
31. Explain the significance of identifying customer needs and responding to them in a professional manner.
32. Discuss the significance of maintaining hygiene and dressing appropriately

**Getting Ready for apprenticeship & Jobs Duration: 8 Hours**

33. Create a professional Curriculum Vitae (CV)
34. Use various offline and online job search sources such as employment exchanges, recruitment agencies, and job portals respectively
35. Discuss the significance of maintaining hygiene and confidence during an interview
36. Perform a mock interview
37. List the steps for searching and registering for apprenticeship opportunities

## Module 8: Processing makhana seeds and preparing makhana products

### Mapped to AGR/N0330 v2.0

#### Terminal Outcomes:

- Elucidate ways to process makhana seeds and prepare makhana products.
- Explain the process of performing post-processing activities.
- Elucidate ways to market makhana products.

Duration: 15:00	Duration: 15:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>• List different types of makhana products prepared after processing of makhana seeds.</li> <li>• List different grades of makhana.</li> <li>• State different value-added makhana products.</li> <li>• List different types of raw materials required for the preparation of different makhana products.</li> <li>• Describe post-harvest processing steps followed for makhana processing.</li> <li>• Explain the use of relevant tools, equipment and machineries for processing of makhana seeds and preparation of makhana seeds.</li> <li>• Elucidate how to process makhana seeds and the activities involved, e.g. pre-heating, roasting, cleaning, hammering and polishing.</li> <li>• Describe the methods of preparation of different value-added makhana products.</li> <li>• State the appropriate packing material to pack processed makhana products.</li> <li>• Explain the importance of ensuring hygiene in food processing units and the applicable regulations, e.g. FSSAI regulations.</li> <li>• Explain the importance of carrying out regular maintenance of tools, equipment and machineries.</li> <li>• Explain how to carry out regular repair and maintenance of the tools, equipment and machineries used in</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate how to pre-heat the sun-dried makhana nuts in cast iron pans or earthen pitchers over the fire at the recommended temperature, stirring them continuously.</li> <li>• Show how to roast makhana seeds after being dried in cast iron pans at an appropriate temperature, ensuring continuous stirring.</li> <li>• Demonstrate the process of cleaning the makhana seeds after roasting and hammer them using an appropriate tool to allow white puff to pop out of the black makhana seeds.</li> <li>• Demonstrate the process of carrying out polishing of processed makhana seeds following the appropriate method to smoothen their surface and achieve more whiteness.</li> <li>• Demonstrate the use of the appropriate packing material such as polythene or gunny bags to pack the fully processed makhana seeds.</li> <li>• Show how to prepare the relevant tools and equipment for preparing makhana products.</li> <li>• Demonstrate how to prepare various makhana products, such as makhana flakes, instant makhana kheer mix, flavoured makhana pops, roasted makhana pops, etc.</li> <li>• Demonstrate the use of the relevant tools, equipment and machineries for preparing makhana products, following the manufacturers’ instructions to ensure personal safety.</li> </ul>

<p>food processing units.</p> <ul style="list-style-type: none"> <li>• Elucidate the relevant safety precautions to be taken while carrying out repair and maintenance of relevant tools, equipment and machineries.</li> <li>• Discuss the relevant post-processing activities.</li> <li>• Describe the storage, safe handling and transporting procedures for makhana.</li> <li>• Discuss the applicable Good Manufacturing Practices (GMP) and Sanitation Standard Operating Procedures (SSOP) norms.</li> <li>• Explain the concept of Hazard Analysis Critical Control Point (HACCP).</li> <li>• Explain the use of relevant tools and equipment for preparing different makhana products.</li> <li>• List different types of buyers of makhana products.</li> <li>• Describe the process of negotiating with buyers.</li> <li>• State the appropriate packing material and mode of transport for makhana products.</li> <li>• Explain the recommended measures to be followed to protect makhana products from damage and contamination while handling and transporting them.</li> <li>• Explain the importance of maintaining records of sales and payments.</li> </ul>	<ul style="list-style-type: none"> <li>• Show how to pack the processed makhana products using appropriate packing materials.</li> <li>• Demonstrate the process of carrying out regular repair and maintenance of the relevant tools, equipment and machineries.</li> <li>• Demonstrate how to process the payments using the buyer-preferred e-payment method.</li> <li>• Show how to calculate the benefit-cost (B:C) ratio.</li> <li>• Prepare a sample manual and/or electronic record of sales and payments using the physical registers and/or the relevant computer application.</li> </ul>
<p><b>Classroom Aids</b></p>	
<p>Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop</p>	
<p><b>Tools, Equipment and Other Requirements</b></p>	
<p>Ventury, Cotton Bags, Packaging Materials, etc.</p>	

## Module 9: On-the-Job Training

### *Mapped to Makhana Grower cum Processor*

<b>Mandatory Duration: 30:00</b>	<b>Recommended Duration: 00:00</b>
<b>Location: On-Site</b>	
<p><b>Terminal Outcomes</b></p> <ul style="list-style-type: none"> <li>• Explain the nutritional and medicinal properties of makhana and its various uses.</li> <li>• Treat the makhana seeds following the recommended seed treatment method.</li> <li>• Check the maturity of seedlings for transplanting, and harvest them ensuring no damage.</li> <li>• Transplant seedlings in the field during the recommended months.</li> <li>• Apply the organic and inorganic fertilizers in the makhana production water body/ field in an appropriate quantity.</li> <li>• Apply herbicides/ bio-herbicides safely in the recommended dose using the appropriate equipment.</li> <li>• Use the relevant Personal Protective Equipment (PPE) while collecting makhana to ensure protection from infections and other hazards.</li> <li>• Pack dry makhana in the appropriate packing material.</li> <li>• Roast makhana seeds after being dried in cast iron pans at an appropriate temperature, ensuring continuous stirring.</li> <li>• Use the relevant tools, equipment and machineries for preparing makhana products, following the manufacturers' instructions.</li> <li>• Carry out regular repair and maintenance of the relevant tools, equipment and machineries.</li> <li>• Prepare manual and/or electronic record of sales and payments using the physical registers and/or the relevant computer application.</li> </ul>	

## Annexure

### Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
<b>10<sup>th</sup> Class</b>	Class 10 <sup>th</sup>	5	Agriculture Crop Production	0		Makhana Grower cum Processor with 5 Years' experience with 10th Pass. Experience certificate issued by BDO/Agriculture Officer/Head of Gram panchayat/ Loan disbursing bank or financial institution on official letter Head
<b>12<sup>th</sup> Class</b>	Class 12 <sup>th</sup>	4	Agriculture Crop Production	0		Ex-Service-Man including Ex-Paramilitary personnel: Minimum Qualification is 10+2 with an Honourable Discharge/ Pension. SSC would consider a relaxation/waiver of sector specific experience on case-to-case basis.
<b>Diploma in Agriculture</b>	Diploma in Agriculture/ Horticulture	3	Agriculture Crop Production	0		
<b>Graduate</b>	Graduate (Agriculture /Horticulture/Botany/Forestry/Fisheries)	0.5	Agriculture Crop Production	0		For school Program minimum qualification of Trainer should be Graduate (Agriculture /Horticulture/Botany/Forestry/Fisheries). Their Teaching experience will be considered industry experience
<b>Post Graduate</b>	Post Graduate (Agriculture/Horticulture/Botany/Forestry/Fisheries)	0.5	Agriculture Crop Production	0		

Trainer Certification	
Domain Certification	Platform Certification

Certified for Job Role “**Makhana Grower cum Processor**”, mapped to QP: “AGR/Q0306, v2.0”, Minimum accepted score is 80%

Recommended that the Trainer is certified for the Job Role: “Trainer (Vet and Skills)”, mapped to the Qualification Pack: “MEP/Q2601, v2.0”. The minimum accepted score as per MEPSC guidelines is 80%.

## Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training/Assessment Experience		Remarks
		Years	Specialization	Years	Specialization	
<b>B.Sc.</b>	Agriculture/ Botany/ Horticulture/ Forestry and related streams	5	Makhana production and processing practices /Horticulture/ Forest and related experience	0		Practical skills and knowledge required in Makhana production and processing practices
<b>M.Sc.</b>	Botany/ Horticulture/ Forestry and related streams	2	Makhana production and processing practices / Horticulture/ Forest and related experience	0		Practical skills and knowledge required in Makhana production and processing practices
<b>PhD</b>	Horticulture/ Forestry / Botany and related streams	1	Makhana production and processing practices / Horticulture/ Forest and related experience	0		Practical skills and knowledge required in Makhana production and processing practices

Assessor Certification	
Domain Certification	Platform Certification
Certified for Job Role “ <b>Makhana Grower cum Processor</b> ”, mapped to QP: “AGR/Q0306, v2.0”, Minimum accepted score is 80%	Certified for the Job Role: “Assessor (Vet and Skills)”, mapped to the Qualification Pack: “MEP/Q2701, v2.0”, with a minimum score of 80%.

## Assessment Strategy

### Assessment System Overview

In Agriculture Sector it is of ultimate importance that individuals dealing with crop production or livestock have the requisite knowledge and competencies to undertake the task. Based on the Assessment Criteria, SSC in association with empaneled AAs, define the test structure for the given job roles to cover the required skills and competencies. Assessment strategy consists of the following:

1. Multiple Choice Questions: To assess basic knowledge (Objective/Subjective)
2. Viva: To assess awareness on processes (Oral and/or written questioning)
3. Practical: To evaluate skills and identify competencies. (Observation)

Assessments for knowledge and awareness on processes may be conducted through 'real-time' internet-based evaluation or by conducting the same 'offline' through TABs. Skills and competencies are to be assessed by conducting 'practical' on the ground through qualified and ToA certified assessors.

An individual must have adequate knowledge and skills to perform a specific task, weightage for different aspects of the assessment is given as follows:

- Multiple Choice Questions: 20%-30%, depending on the specific QP
- Viva: 20%
- Practical: 50% - 60% (Involves demonstrations of applications and presentations of procedures/tasks and other components)
- Assessment will be carried out by certified assessors through empaneled assessment partners. Based on the results of the assessment; ASCI will certify the learners/candidates

### Testing Environment

Assessments are conducted on laptops, Mobiles and android tablets via both offline and online mode depending on the internet connectivity at the assessment location.

In remote locations/villages, assessments get delivered through tablets without the requirement of the Internet.

- Multilingual assessments (ASCI is conducting the assessments in 13 + languages pan India)
- Rubric driven assessments in Practical/Viva sections and responses recorded accordingly
- All responses, data, records and feedback stored digitally on the cloud
- Advanced auto-proctoring features – photographs, time-stamp, geographic-tagging, toggle- screen/copy-paste disabled, etc.
- Android-based monitoring system
- End to end process from allocation of a batch to final result upload, there is no manual intervention

- Assessment will normally be fixed for a day after the end date of the training / within 7 days of completion of training.
- Assessment will be conducted at the training venue
- The room where assessment is conducted will be set with proper seating arrangements with enough space to curb copying or other unethical activities
- Question bank of theory and practice will be prepared by ASCI /assessment agency and approved ASCI. Only from approved Question Bank assessment agency will prepare the question paper. Theory testing will include multiple-choice questions, pictorial questions, etc. which will test the trainee on his theoretical knowledge of the subject.

<b>Assessment</b>			
<b>Assessment Type</b>	<b>Formative or Summative</b>	<b>Strategies</b>	<b>Examples</b>
Theory	Summative	MCQ/Written exam	Knowledge of facts related to the job role and functions. Understanding of principles and concepts related to the job role and functions
Practical	Summative	Structured tasks/Demonstration	Practical application /Demonstration /Application tasks
Viva	Summative	Questioning and Probing	Mock interviews on the usability of job roles/advantages /importance of adherence to procedures. Viva will be used to gauge trainee's confidence and correct knowledge in handling the job situation

- The theory, practical and viva assessments will be carried out on the same day. In case of a greater number of candidates, the number of assessors and venue facilitation be increased and facilitated

The question paper pre-loaded in the computer /Tablet and it will be in the language as requested by the training partner.

## Assessment Quality Assurance framework

### Assessment Framework and Design:

Based on the Assessment Criteria, SSC in association with AAs will define the test structure for the given roles to cover the required skills and competencies. ASCI offer a bouquet of tools for multi-dimensional evaluation of candidates covering language, cognitive skills, behavioural traits and domain knowledge.

**Theoretical Knowledge** - Item constructs and types are determined by a theoretical understanding of the testing objectives and published research about the item types and constructs that have shown statistical validity towards measuring the construct. Test item types that have been reported to be coachable are not included. Based on these, items are developed by domain experts. They are provided with comprehensive guidelines of the testing objectives of each question and other quality measures.

**Type** – Questions based on Knowledge Required, Case-based practical scenario questions and automated simulation-based questions.

**Practical Skills** - The practical assessments are developed taking into consideration two aspects: what practical tasks is the candidate expected to perform on the job and what aspects of the job cannot be judged through theoretical assessments. The candidates shall be asked to perform either an entire task or a set of subtasks depending on the nature of the job role

**Type** – Standardized rubrics for evaluation against a set of tasks in a demo/practical task

**Viva Voce** - Those practical tasks which cannot be performed due to time or resource constraints are evaluated through the viva mode. Practical tasks are backed up with Viva for thorough assessment and complete evaluation

**Type** – Procedural questions, dos and don'ts, subjective questions to check the understanding of practical tasks.

The assessor has to go through an orientation program organized by the Assessment Agency. The training would give an overview to the assessors on the overall framework of QP evaluation. The assessor shall be given a NOS and PC level overview of each QP as applicable. The overall structure of assessment and objectivity of the marking scheme will be explained to them. The giving of marks will be driven by an objective framework that will maintain the standardization of the marking scheme.

### Type of Evidence and Evidence Gathering Protocol:

During the assessment the evidence collected by AAs and ASCI are:

- GeoTagging to track ongoing assessment
- AA's coordinator emails the list of documents and evidence (photos and videos) to the assessor one day before the assessment. The list is mentioned below:
  - Signed Attendance sheet
  - Assessor feedback sheet

- Candidate feedback sheet
- Assessment checklist for assessor
- Candidate Aadhar/ID card verification
- Pictures of the classroom, labs to check the availability of adequate equipment's and tool to conduct the training and assessment
- Pictures and videos of Assessment, training feedback and infrastructure.
- Apart from the Assessor, a Technical assistant is popularly known as Proctor also ensures the proper documentation and they verify each other's tasks.
- To validate their work on the day of the assessment, regular calls and video calls are done.
- On-boarding and training of assessor and proctor is done on a timely basis to ensure that the quality of the assessment should be maintained.
- Training covers the understanding of QP, NSQF level, NOS and assessment structure

### **Methods of Validation**

- Morning Check (Pre-Assessment): Backend team of AA calls and confirms assessor/technical SPOC event status. Assessor/Technical SPOC are instructed to reach the centre on time by 9:30 AM / as decided with TC and delay should be highlighted to the Training Partner in advance.
- Video Calls: Random video calls are made to the technical SPOC/assessor so as to keep a check on assessment quality and ensure assessment is carried out in a fair and transparent manner
- Aadhar verification of candidates
- Evening Check (Post Assessment): Calls are made to the ground team to ensure the event is over by what time and the documentation is done properly or not.
- TP Calling: To keep a check on malpractices, an independent audit team calls the TP on a recorded line to take confirmation if there was any malpractice activity observed in the assessment on part of the AA/SSC team. If calls are not connected, an email is sent to TP SPOC for taking their confirmation
- Video and Picture Evidence: Backend team collects video and pictures for assessment on a real-time basis and highlights any issue such as students sitting idle/ trainer helping the candidates during the assessment.
- Surprise Visit: Time to time SSC/AA Audit team can visit the assessment location and conduct a surprise audit for the assessment carried out by the ground team.
- Geo Tagging: On the day of the assessment, each technical SPOC is required to login into our internal app which is Geotagged. Any deviation with the centre address needs to be highlighted to the assessment team on a real-time basis.

### **Method for assessment documentation, archiving, and Access:**

- ASCI have a fully automated result generation process in association with multiple AAs
- Theory, Practical and Viva marks form the basis of the results and encrypted files generated to avoid data manipulation. All responses were captured and stored in the

System with Time-Stamps at the end of AAs and SSC. NOS-wise and PC-wise scores can be generated.

- Maker Checker concept: One person prepares the results and another audit result which is internally approved by AA at first and then gets vetted at the end of SSC
- All softcopies of documents are received from the on-ground tech team over email. The same is downloaded by our internal backend team and saved in Repository. The repository consists of scheme-wise folders. These scheme-wise folders have two job role-specific folders. These specific folders have Year wise and Month wise folders where all documents are saved in Batch specific folders. All Hard copies are filed and stored in the storeroom.

#### ***Result Review & Recheck Mechanism –***

- Time-stamped assessment logs
- Answer/Endorsement sheets for each candidate
- Attendance Sheet
- Feedback Forms: Assessor feedback form, Candidate feedback form, TP feedback form
- The results for each of the candidate shall be stored and available for review (retained for 5 years/ till the conclusion of the project or scheme)

# References

## Glossary

Term	Description
<b>Declarative Knowledge</b>	Declarative knowledge refers to facts, concepts and principles that need to be known and/or understood in order to accomplish a task or to solve a problem.
<b>Key Learning Outcome</b>	Key learning outcome is the statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical application).
<b>OJT (M)</b>	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on site
<b>OJT (R)</b>	On-the-job training (Recommended); trainees are recommended the specified hours of training on site
<b>Procedural Knowledge</b>	Procedural knowledge addresses how to do something, or how to perform a task. It is the ability to work, or produce a tangible work output by applying cognitive, affective or psychomotor skills.
<b>Training Outcome</b>	Training outcome is a statement of what a learner will know, understand and be able to do upon the completion of the training.
<b>Terminal Outcome</b>	Terminal outcome is a statement of what a learner will know, understand and be able to do upon the completion of a module. A set of terminal outcomes help to achieve the training outcome.

## Acronyms and Abbreviations

Term	Description
AGR	Agriculture
NOS	National Occupational Standard (s)
NSQF	National Skills Qualifications Framework
OJT	On-the-job Training
QP	Qualifications Pack
PwD	People with Disability
PPE	Personal Protective Equipment