

# Model Curriculum

## Mariculture Operator

**SECTOR: AGRICULTURE & ALLIED**  
**SUB-SECTOR: FISHERIES**  
**OCCUPATION: AQUACULTURE**  
**REF ID: AGR/Q4909, v1.0**  
**NSQF LEVEL: 4**



## Certificate

### CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

**AGRICULTURE SKILL COUNCIL OF INDIA**

for the


**MODEL CURRICULUM**

Complying to National Occupational Standards of  
Job Role/Qualification Pack: **'Mariculture Operator'** QP No. **'AGR/Q4909 NSQF Level 4'**

Date of Issuance: August 30<sup>th</sup>, 2017

Valid up to: March 31<sup>st</sup>, 2021

\* Valid up to the next review date of the Qualification Pack

  
Authorised Signatory  
(Agriculture Skill Council of India)

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# Mariculture Operator

## CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Mariculture Operator”, in the “Agriculture & Allied” Sector/Industry and aims at building the following key competencies amongst the learner

<b>Program Name</b>	<b>Mariculture Operator</b>		
<b>Qualification Pack Name &amp; Reference ID.</b>	AGR/Q4909, v1.0		
<b>Version No.</b>	1.0	<b>Version Update Date</b>	
<b>Pre-requisites to Training</b>	Class 5		
<b>Training Outcomes</b>	<p><b>After completing this programme, participants will be able to:</b></p> <ul style="list-style-type: none"> <li>• <b>Perform sourcing of seeds from hatcheries and set up mariculture systems:</b> Identify suitable species for farming, source seeds from hatcheries, transport seeds, condition the seeds, fabricate rafts, cages, prepare pens, moor the rafts and cages, install rafts and cages in the site, make the pens ready for stocking seeds, prepare saline ponds for marine/brackishwater fish culture, assess and evaluate the suitability of the site for farming of the concerned species.</li> <li>• <b>Manage the mariculture system by proper feeding and health monitoring:</b> Stock the finfish fingerlings to pens, ponds and cages at suitable stocking densities, feed with appropriate feeds, monitor water quality, grade the fish in the culture system if differential growth is noted, monitor the growth and disease occurrences if any, treat the diseased fish and manage the health of the cultured species.</li> <li>• <b>Perform commercially viable mariculture techniques of different marine/brackishwater species</b> by implementing different culture practices depending upon the species – either raft culture, pen culture, cage culture or saline pond culture of finfish and/or shellfish/sea weed</li> <li>• <b>Perform harvesting and marketing activities for marine organisms:</b> Planning for timely harvesting, identifying suitable markets, surveying species demand, reasonable price for sale, record keeping and documentation.</li> <li>• <b>Practice health and safety at the work place:</b> Perform bio-security protocols, implement safety and sanitation practices for self and farmed fish/shellfish.</li> </ul>		

This course encompasses 4 out of 4 National Occupational Standards (NOS) of “Mariculture Operator” Qualification Pack issued by “Agriculture Skill Council of India”.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	<b>Introduction</b>  <b>Theory Duration</b> (hh:mm) 05:00  <b>Practical Duration</b> (hh:mm) 00:00  <b>Corresponding NOS Code</b> Bridge Module	<ul style="list-style-type: none"> <li>Understand General Discipline in the class room (Do's &amp; Don'ts)</li> <li>Study the scope and importance of Mariculture in India</li> <li>Understand the role of a Mariculture Operator and the progression pathways</li> <li>Identify different marine/brackishwater finfish/shellfish and sea weed species that can be cultured</li> </ul>	Laptop, white board, marker, projector
2	<b>Procure seeds and set up mariculture system</b>  <b>Theory Duration</b> (hh:mm) 15:00  <b>Practical Duration</b> (hh:mm) 80:00  <b>Corresponding NOS Code</b> AGR/Q4933	<ul style="list-style-type: none"> <li>Identify suitable species for culture and their requirements</li> <li>Collect and source the required seeds</li> <li>Carry out the packing and transportation protocols of seeds</li> <li>Carry out quarantining and conditioning protocols for seeds</li> <li>Rear the seeds of finfish in nurseries till stockable size</li> <li>Fabricate different types of cages – cage frame, net cage different types of mooring and installation at the site.</li> <li>Fabricate different types of rafts, their mooring and installation at the site.</li> <li>Set up a pen structure</li> <li>Set up a saline water pond</li> <li>Seed the mussels /oysters in grow out systems</li> <li>Attach the sea weed fragments in rafts</li> <li>Stock in appropriate density by assessing the carrying capacity of the grow out system</li> <li>Stock the fingerlings of finfish in cages/pens/ponds</li> </ul>	Laptop, white board, marker, projector, Audio-visual aids, Water pump, Air or Oxygen diffusers, Aerators, Mechanical filters - like leaf filters, Chemical and biological filters, protein skimmer, UV steriliser, Water analysis meters, Tubes, Power backup, PVC pipes. Different types of cage and raft construction materials, cage frame, net cages, mooring materials for cages and rafts, bivalve rafts, seaweed rafts
3	<b>Manage the mariculture system by proper feeding and health monitoring</b>  <b>Theory Duration</b> (hh:mm)	<ul style="list-style-type: none"> <li>Feed the farmed animals with suitable feed types and as per protocols for the different stages of farming</li> <li>Estimate and monitor the water quality parameters</li> <li>Clean the fouling materials from net cages/ ropes for mussel and oysters</li> </ul>	Laptop, white board, marker, projector, Audio-visual aids, FRP boat with outboard engine, FRP tanks,

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	10:00  <b>Practical Duration</b> (hh:mm) 50:00  <b>Corresponding NOS Code</b> AGR/Q4934	<ul style="list-style-type: none"> <li>Grade the fishes based on size difference due to differential growth.</li> <li>Exchange the Net cages whenever needed.</li> <li>Collect samples regularly and assess the growth of the species being cultured</li> <li>Monitor the diseases and manage the health of the organism in culture systems</li> </ul>	Grinder, Mixer, Pelletiser, diving equipment's hand nets, feeding trays, seechi disk, pH meter, refractometer, scissors, water testing kit, buckets, forceps, dropper, tissue paper, syringes, simple microscope, Power backup
4	<b>Perform harvesting and marketing activities for marine organisms</b>  <b>Theory Duration</b> (hh:mm) 10:00  <b>Practical Duration</b> (hh:mm) 35:00  <b>Corresponding NOS Code</b> AGR/N4935	<ul style="list-style-type: none"> <li>Conduct market survey to assess the demand</li> <li>Identify suitable markets</li> <li>Fix the reasonable price for sale,</li> <li>Undertake timely harvesting</li> <li>Work out B:C ratio</li> </ul>	Laptop, white board, marker, projector, PPEs bags, first aid box, Hand nets and cast nets, dip nets, Hand gloves, boots, head gear, autoclave, transport vehicles with water storage capacity, oxygen cylinders, ropes, threads, polypropylene tanks, oxygen tablets, vitamin B 12 tablets for removal of stress during transportation, siphoning pipes, portable DC chargeable battery aerators, small ice machine
5	<b>Ensure safety hygiene and sanitation practices for culture operations</b>  <b>Theory Duration</b> (hh:mm) 10:00  <b>Practical Duration</b> (hh:mm) 25:00	<ul style="list-style-type: none"> <li>Maintain personal hygiene and safety</li> <li>Maintain health and hygiene of seed during transportation and at various stages of growth and maturity</li> <li>Ensure safety measures and upkeep of water bodies used in fish culture</li> <li>Perform timely record keeping and documentation</li> </ul>	First aid box, Hand nets and cast nets, Dip nets, Hand gloves, boots, Head gear, Apron, Fresh towel, Cotton.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	<b>Corresponding NOS Code</b> AGR/Q4918		
	<b>Total Duration:</b>  <b>Theory Duration</b> (hh:mm) <b>50:00</b>  <b>Practical Duration</b> (hh:mm) <b>190:00</b>	<b>Unique Equipment Required:</b> Laptop, white board, marker, projector, Audio-visual aids, Water pump, Air or Oxygen diffusers, Aerators, Mechanical filters - like leaf filters, Tubes, Chemical and biological filters, Protein skimmers, UV sterilisers, Cage frame, net cages, mooring materials for cages and rafts, rafts for bivalves, diving equipments, FRP boat with outboard engine, Power backup, Grinder, Mixer, Pelletiser, Dip net or any other harvesting gear, safety shoes, goggles, first aid box, hand gloves, head gear, weed cutter, scissors, forceps, syringes, seechi disc, refractometer, simple microscope, , chemicals storage bottles, tissue paper, oxygen cylinders, oxygen tablets, vitamin B12 tablets, erythromycin capsules, polypropelene tanks, ropes, threads, autoclave, water testing kit, siphoning pipes, portable DC chargeable battery operated aerators, aeration pipes, pH meter	

Grand Total Course Duration: **240 Hours, 0 Minutes**

*(This syllabus/ curriculum has been approved by **Agriculture Skill Council of India**)*

## Trainer Prerequisites for Job role: “Mariculture Operator” mapped to Qualification Pack: “AGR/Q4909, v1.0”

Sr. No.	Area	Details
1	<b>Description</b>	Trainer is responsible for educating the trainees – identifying the organisms for culture in mariculture system, design and construction of cages, rafts and ponds and their appropriate management practices for the production of organisms which are safe for human consumption.
2	<b>Personal Attributes</b>	Trainer should be a Subject Matter Expert. He/ she should have good communication, leadership, observation and practical oriented skills.
3	<b>Minimum Educational Qualifications</b>	Diploma in Fisheries
4a	<b>Domain Certification</b>	Certified for Job Role: “ <u>Mariculture Operator</u> ” mapped to QP: “ <u>AGR/Q4909, v1.0</u> ”. Minimum accepted score is 80%.
4b	<b>Platform Certification</b>	Certified for the Job Role: “Trainer”, mapped to the Qualification Pack: “MEP/Q0102”. Minimum accepted % as per respective SSC guidelines is 80%.
5	<b>Experience</b>	<ul style="list-style-type: none"> <li>• B. F. Sc/ M.F.Sc./ M.Sc. in Marine Biology/ Industrial Fisheries/ Mariculture</li> <li>• B. Sc. (Fisheries)/M.Sc. Zoology with 1 year of relevant work experience</li> <li>• B. Sc. Zoology with 2 years of relevant work experience</li> <li>• Diploma (more than 12 months) in fisheries with 3 years of relevant work experience</li> </ul>



## Annexure: Assessment Criteria

<b>Assessment Criteria</b>	
<b>Job Role</b>	<b>Mariculture Operator</b>
<b>Qualification Pack</b>	<b>AGR/Q4909, v1.0</b>
<b>Sector Skill Council</b>	<b>Agriculture</b>

### **Guidelines for Assessment**

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC
3. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below)
4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criteria
5. To pass the Qualification Pack, every trainee should score a minimum of 70% in aggregate
6. In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack

Assessment outcomes	Assessment criteria for outcomes	Marks Allocation			
		Total Marks	Out Of	Theory	Skills Practical
1. AGR/N4933 Procure seeds and set up mariculture system	PC1. identify candidate species suitable for culture	<b>100</b>	10	3	7
	PC2. identify type of seeds required for marine aqua culture system		10	3	7
	PC3. establish sources of seed and procure them		10	3	7
	PC4. interpret the behavior of organisms in culture system		10	3	7
	PC5. decide suitable environment for the culture of specific organisms		10	3	7
	PC6. identify farming protocols for the farming species		10	3	7
	PC7. make cost effective and site specific cages/rafts and secure them with proper anchors and ropes		10	3	7
	PC8. maintain stock of seed in cages		10	3	7
	PC9. attach seeds to ropes in the case of rafts		10	3	7
	PC10. constantly monitor the mariculture system as it is open to the sea, poaching, and other fluctuations of the ocean or saline water body		10	3	7
			<b>100</b>	<b>30</b>	<b>70</b>
2. AGR/N4934 Manage the mariculture system by proper feeding and health monitoring	PC1. rear the seeds to stockable size	<b>100</b>	12	4	8
	PC2. monitor the mariculture structure regularly to avoid predators and contamination		12	4	8
	PC3. check on displacement from anchored position and other environmental conditions at sea		13	4	9
	PC4. determine health parameters to judge the condition of organisms in culture system		12	4	8
	PC5. determine the correct dose of medicines / disinfectants to cure diseases		13	4	9
	PC6. separate the diseased organisms from the healthy		13	3	10

	organisms in case of disease outbreak				
	PC7. diagnose the problem/disease and treat appropriately		13	4	9
	PC8. monitor the condition of organisms for signs of improvement		12	3	9
			<b>100</b>	<b>30</b>	<b>70</b>
3. AGR/N4935 Perform harvesting and marketing activities for mariculture system	PC1. decide on the type of harvesting system to be used, single or multi harvest, depending on	<b>100</b>			
	<ul style="list-style-type: none"> <li>local demand and supply of fish</li> </ul>		10	3	7
	<ul style="list-style-type: none"> <li>proximity to market</li> </ul>				
	<ul style="list-style-type: none"> <li>proximity to fish traders</li> </ul>				
	PC2. harvest the target species safely and hygienically once they have reached harvestable size		10	3	7
	handle hygienically, clean and weigh the harvested stock according to guidelines of exporters/clients				
	PC3. ensure timely harvesting of fin fish, mollusks, oysters and other organisms		10	3	7
	PC4. identify markets where organisms can fetch reasonable price		10	3	7
	PC5. pack and transport organisms in good condition		10	3	7
	PC6. estimate the total harvest and accordingly contact the prospective buyers		10	3	7
	PC7. implement the marketing procedures for organisms		10	3	7
	PC8. identify demand of organisms in the market to overcome situation compelling distress sale of organisms		10	3	7
PC9. maintain a record of sale proceeds	10	3	7		
PC10. record cost of inputs such as materials used in construction of cages, rafts etc. and other miscellaneous expenditures	10	3	7		
			<b>100</b>	<b>30</b>	<b>70</b>
4. AGR/N4918: Ensure	PC1. ensure suitable measures	<b>100</b>	5	2	3

safety, hygiene and sanitation practices for culture operations	for protection of from natural calamities such as flood, protect dyke from erosion or break			
	PC2. ensure protection and prevent escape of the cultured organisms	5	2	3
	PC3. identify common predators and preying organisms in water bodies	4	1	3
	PC4. apply suitable methods such as fencing to keep away predators in water bodies to protect fish culture	5	1	4
	PC5. restrict entry of unauthorized persons into the premises	5	1	4
	PC6. be fully aware of the dosage, toxicity level and method of application of chemicals / medicines used for fish culture	5	1	4
	PC7. ensure all chemicals are adequately labelled and stored safely	4	1	3
	PC8. identify a quarantine area and implement protocols of quarantine	5	1	4
	PC9. be aware of the possibilities of bacterial (water borne, air borne, formite borne )and other contamination from human handling	5	2	3
	PC10. apply effective systems and routines to ensure healthy and hygienic conditions during all stages of fish culture including transportation and marketing	5	2	3
	PC11. ensure that the fish culture premises are constantly monitored/inspected for breaches in the protection provided by health and hygiene measures	5	2	3
	PC12. undertake basic safety checks before operation of any equipments	4	1	3
	PC13. wear protective clothing and gear as and when required and ensure adherence to safety guidelines	5	1	4
	PC14. report potential hazards to the supervisor immediately	4	1	3
	PC15. follow standard procedures to deal with accidents and emergency situations	5	2	3
	PC16. use first aid kit as and when required and provide appropriate treatment in case	5	1	4

	of any injuries				
	PC17. ensure maintenance of suitable soil and water quality parameters at all times with frequent tests		5	2	3
	PC18. ensure specified feed is provided to organisms at regular intervals and excess feeding is avoided		5	2	3
	PC19. carry out regular inspection of organisms for possible presence of parasites, pathogenic infections, any phenotypic disorder, spot, etc. which are usually the signs of ailments or disease outbreak		5	2	3
	PC20. ensure all nets, utensils and vessels used are decontaminated and clean		4	1	3
	PC21. implement effective security measures for prevention of theft/sabotage		5	1	4
			<b>100</b>	<b>30</b>	<b>70</b>
<b>GRAND TOTAL</b>		<b>400</b>	<b>400</b>	<b>120</b>	<b>280</b>