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भारतीय मानक मसौदा  
उत्तम मत्स्यपालन व्यवहार रीतियों की अपेक्षाएं – इण्डिया जीएक्यूपी  
समुद्री शैवाल खेती

*Draft Indian Standard*  
Requirements for Good Aquaculture Practices – India GAqP  
Seaweed Cultivation

**ICS 67.120.30**

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Fish, Fisheries and Aquaculture  
Sectional Committee, FAD 12

Last date of comments:  
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**FOREWORD**

*(Formal clause will be added later)*

Seaweeds are macroscopic algae growing in the marine and shallow coastal waters and on rocky shores. Seaweeds are wonder plants of the sea, the new renewable source of food, energy, chemicals and medicines with manifold nutritional, industrial, biomedical, agriculture and personal care applications. Seaweeds are also termed as the ‘Medical Food of the 21st Century’ as they are being used in various therapeutic and medical treatments. The major industrial applications of seaweeds are as a source of agar, agarose and carrageenan used in laboratories, pharmaceuticals, cosmetics, cardboard, paper, paint and processed foods.

Seaweeds are abundant along the Tamil Nadu and Gujarat coasts and around Lakshadweep and Andaman & Nicobar Islands. Rich seaweed beds occur around Mumbai, Ratnagiri, Goa, Karwar, Varkala, Vizhinjam, Pulicat in Tamil Nadu, Andhra Pradesh and Chilka in Orissa.

Seaweed cultivation is undertaken in shallow coastal waters of maritime States, wherein bamboo-rafts or tube-nets are held in clusters. The Red Algae *Gracilaria edulis*, *Gracilaria dura* and *Kappaphycus alvarezii* are highly suitable for cultivation on floating bamboo rafts or tube-nets held in the sea. Considerable progress is being made in productivity of aquaculture products in the country. Concerns about food safety and quality, sustainability, environmental protection, worker safety and welfare have also gained importance. Thus, it is desirable to set up control and compliance systems for various kinds of aquaculture produce. In this context, it is necessary to pay attention to the quality of production

practices requiring minute attention at different aspects of production, storage, handling and distribution. It is, therefore, necessary to define and assign certain common minimum standards to facilitate trade in these products and to win the confidence of the consumers within the country and outside.

Such standards envisaging focused approach for implementing good aquaculture practices and traceability through appropriate infrastructure, record keeping and monitoring would reap following broad benefits:

- a) Development of basic infrastructure at the field level,
- b) Build up culture for good aquaculture practices by the farmers,
- c) Uniform approach across farms regardless of their sizes
- d) Increased awareness among the producers as well as the consumers about the need for consumption of good quality and safe food,
- e) Traceability through complete integration of food chain,
- f) Improvement in the environment,
- g) Worker safety and welfare, and
- h) Reputation in the international market as a producer of good quality and safe produce, and Overcoming the Technical Barriers to Trade (TBTs).

This standard is part of a series of Indian Standards on Good Aquaculture Practices.

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 2022 'Rules for rounding off numerical values (second revision)'.

## 1 SCOPE

This standard covers the control points and compliance criteria necessary to be followed by the producers (individual producers and/or members of a producer group) of seaweed crops.

## 2 TERMINOLOGY

For the purpose of this standard, following terminologies shall apply:

**2.1 Good Aquaculture Practices** — Practices that address environmental, economic and social sustainability for on-farm processes, and result in safe and quality food and non-food aquaculture products.

**2.2 Applicant producer/producer group** — Individual/organization that has applied for certification to IndiaGAqP certification body.

**2.3 Hazard** — A biological, chemical, physical agent in, or condition of, with the potential to cause an adverse health effect.

**2.4 Individual producer** — A person/organization legally responsible for on farm production, who retains ownership of all the produce covered in the IndiaGAqP license.

**2.5 Inspection** — An examination of all aquaculture practices in order to verify compliance to requirements specified in this standard.

**2.6 Record** — Document showing objective evidence of the tasks performed and results achieved.

**2.7 Self-Inspection** — Internal inspection of the registered product carried out by the grower on his/her farm using Control Points and Compliance Criteria.

**2.8 Traceability** — The ability to trace the history, use or location of a product (i.e., the origin of materials and parts, processes applied to the product, or its distribution and placement after delivery) by means of a record.

**2.9 Worker** — Any person on the farm who has been contracted to carry out a task. This includes farm owners and managers.

**2.10 Producer group** — A recognized group of producers applying for certification with an internal procedure and internal control of all the members registered to the India GAqP requirements, and complying the requirements as specified in this standard.

**2.11 Field** — Separate unit of land within a farm.

**2.12 Farm** — A farm is an agricultural production unit or group of agricultural production units; covered by same operational procedures, farm management.

**2.13 Environment** — Surroundings in which an activity takes place including air, water, land, natural resources, flora, fauna, humans, and their interrelation.

**2.14 Certification** — All actions leading to the issuance of an IndiaGAqP licence.

**2.15 Standard Operating Procedure** — A written document which details an operation, analysis, or action whose mechanisms are prescribed thoroughly and which is commonly accepted as the method for performing certain routine or repetitive tasks.

### **3 CONTROL POINTS AND COMPLIANCE CRITERIA**

**3.1** Control Points and Compliance Criteria required to be followed by the applicant producer (individual producer and/or member of a producer group) for independent verification of the aquaculture practices that have gone into the production of the produce are given in Annex A. In addition, the applicant producer (individual producer and/or member of a producer group) shall demonstrate compliance with all applicable statutory and regulatory requirements.

**3.2** These criteria are marked as ‘Major’ or ‘Minor’ or ‘Reco’. The criteria marked as ‘Major’ have a definite effect on the safety and quality of the produce and shall, therefore, be complied with, or shall give adequate assurance about the safety and quality of the produce. The criteria marked as ‘Minor’, though have a bearing on quality, and are those which, if implemented, would provide an advantage to the assessment for IndiaGAqP certification. The criteria marked as ‘Reco’, are those, which though may not have direct bearing on safety and quality of produce but may have other benefits to the producer and are recommended for implementation and are advisory in nature.

**3.3** For the purpose of verification, a grading pattern given below shall be followed for grant of India GAqP license:

| <b>Category of Licence</b> | <b>Compliance of Major Requirements</b> | <b>Compliance of Minor Requirements</b> |
|----------------------------|-----------------------------------------|-----------------------------------------|
| India GAqP — A             | 100%                                    | 90%                                     |
| India GAqP — B             | 100%                                    | 80%                                     |
| India GAqP — C             | 100%                                    | 75%                                     |

### **4 BIS INDIA GAqP CERTIFICATION**

**4.1** BIS India GAqP certification shall be as prescribed under the provisions of Bureau of Indian Standards Act, 2016 and Rules and Regulations framed thereunder. The details of the conditions under which the licence may be granted to producer (individual producer and/or member of a producer group) may be obtained from the Bureau of Indian Standards.

**ANNEX A**

*(Clause 3.1)*

**CONTROL POINTS AND COMPLIANCE CRITERIA**

| <b>Sl No.</b> | <b>Item</b>                                                     | <b>Compliance Level</b> | <b>Requirements</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>Inspection method</b>                                                                                                                         |
|---------------|-----------------------------------------------------------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>(1)</b>    | <b>(2)</b>                                                      | <b>(3)</b>              | <b>(4)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>(5)</b>                                                                                                                                       |
| <b>i)</b>     | <b>IDENTIFICATION, PREPARING THE FARM &amp; FARMING METHODS</b> |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                  |
| a)            | Farming site and location                                       | Major                   | <p>a) The potential sites identified by the research organizations/ fisheries department/other government agencies shall be considered.</p> <p>b) The following criteria are used in identifying the potential sites: sheltered area with adequate current and tidal exchange; sea front with lower inter-tidal distance; area with moderate wave action; area free from silt deposits/ creeks/ mangrove forest/ back water/ brackish waters; area away from freshwater runoff and domestic or agro-industrial effluents discharge; area away from fishing harbour/landing centre; non-hindrance for existing fishing and other allied activities.</p> <p>c) Optimum basic water quality parameters: Salinity (28-38ppt), Sea Surface Temperature(26-31°C), pH (6.5-8.5) and Transparency (2-6 m).</p> | Verification of selected site through appropriate documents provided by research organizations/ fisheries department/ other government agencies. |
| b)            | Farming methods                                                 | Minor                   | Location specific bamboo raft/ monoline/ longline/ tube-net methods can be selected and adopted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Visual inspection and verification of records.                                                                                                   |

|    |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                |
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| c) | Materials for the farming | Major | <ul style="list-style-type: none"> <li>a) Good quality bamboo poles/ ropes/ braider/ used fish nets/ anchor/ knife shall be selected for bamboo raft method of seaweed culture, or</li> <li>b) Good quality casuarina pole/ ropes/ braider/ floats/ knife shall be selected for monoline/longline method of seaweed culture, or</li> <li>c) Good quality fish net/ ropes/plastic pipes/anchor/ floats/ knife shall be selected for tube-net method of seaweed culture.</li> <li>d) Damaged material shall be rejected.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Visual inspection and verification of records. |
| d) | Seed                      | Major | <ul style="list-style-type: none"> <li>a) Seedlings shall be taken from healthy i.e., multiple branches with sharp tips and free from animal attachment and epiphytes, preferably from the young portion of the plant with more apical portions.</li> <li>b) 150 – 200 g of <i>Kappaphycus alvarezii</i> seaweed fragments are inserted in the loop at a spacing of 15 cm along the length of the rope in both raft/monoline/longline methods (in case of <i>Gracilaria edulis</i> it is 25 – 50 g of seed material per tie).</li> <li>c) The seed material of 15 kg <i>Kappaphycus alvarezii</i> fresh weight is loaded into the tubes with the aid of a 1.0 or 1.5 m long plastic pipe acting as a funnel or a hopper for tube-net method (in case of <i>Gracilaria edulis</i> it is 5 kg per tube-net).</li> <li>d) If seedlings are taken from other districts/states, it should be placed in a clean net bag and kept at bottom (1-2 m depth) of the sea for few days before planting.</li> <li>e) Jute gunny bags which can hold 50 kg of seaweed seed materials are selected. They are soaked in clean seawater and fresh seaweed materials are stocked inside the gunny bags. The bags are sealed and transported either through</li> </ul> | Visual inspection and verification of records. |

|             |                                      |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                |
|-------------|--------------------------------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
|             |                                      |       | road/ train/airways. Up to 48 hours, the seaweed seed materials can be transported without any loss.                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                |
| <b>ii)</b>  | <b>MAINTENANCE</b>                   |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                |
| a)          | Maintenance                          | Major | <ul style="list-style-type: none"> <li>a) Unhealthy, broken or lost seedlings shall be replaced periodically.</li> <li>b) Other seaweeds, sediments attached to the plants and ropes shall be removed regularly.</li> <li>c) Broken and drifted plants shall be removed periodically from the farming site.</li> <li>d) Damaged bamboo/casuarinapoles shall be replaced periodically.</li> <li>e) After 1 to 2 years of culture period, the unusable bamboo poles, ropes, braiders, nets shall be disposed properly instead of leaving in the sea/shore.</li> </ul> | Visual inspection and verification of records. |
| <b>iii)</b> | <b>MANAGEMENT</b>                    |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                |
| a)          | Management of disease                | Major | <ul style="list-style-type: none"> <li>a) "Ice-ice" is common disease reported in the seaweed farming. It is caused due to abiotic stress like low salinity, high temperature, and light intensity. The branches will show the symptoms of whitening and eventually disintegrate which may result in crop loss.</li> <li>b) If disease is observed, entire crop shall be harvested and crop holiday shall be given for two to three cycles and farming shall be restarted with new seedlings.</li> </ul>                                                            | Visual inspection and verification of records. |
| b)          | Management during natural calamities | Major | <ul style="list-style-type: none"> <li>a) Based on the early warnings, premature harvest shall be done.</li> <li>b) A portion of seaweed seeds shall be placed in a net bag and kept in deeper waters for further farming.</li> </ul>                                                                                                                                                                                                                                                                                                                               | Visual inspection and verification of records. |
| c)          | Management of Epiphytism             | Minor | Other seaweeds attached to the cultured species shall be removed periodically.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Visual inspection and verification of records. |

|            |                                                 |       |                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                |
|------------|-------------------------------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| <b>iv)</b> | <b>HARVEST</b>                                  |       |                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                |
| a)         | Harvest                                         | Major | <ul style="list-style-type: none"> <li>a) Seaweeds are be ready for harvest in 45 days.</li> <li>b) Entire rope with fully grown seaweeds shall be harvested from raft/monoline/longline/tube-net.</li> <li>c) This method is easy and appropriate to select good seedling materials for the subsequent cropping.</li> </ul>                                                                                                  | Visual inspection and verification of records. |
| <b>v)</b>  | <b>POST-HARVEST HANDLING</b>                    |       |                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                |
| a)         | Post-harvest handling                           | Major | <ul style="list-style-type: none"> <li>a) Harvested seaweed shall be dried in elevated drying platform.</li> <li>b) While drying, impurities like stones, shells and other foreign matters shall be cleaned.</li> <li>c) Harvested and dried seaweed shall be covered with tarpaulin sheets during rainy seasons.</li> <li>d) After seaweeds are dried, it shall be packed in sacks and stored in clean dry place.</li> </ul> | Visual inspection and verification of records. |
| <b>vi)</b> | <b>STORAGE OF SEEDS &amp; FARMING MATERIALS</b> |       |                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                |
| a)         | Storage of seeds                                | Minor | During monsoon and any untoward events, the seeds shall be placed in a clean net bag and kept at 1-2 m depth of the sea preferably on sandy bottom.                                                                                                                                                                                                                                                                           | Visual inspection and interview with farmers.  |
| b)         | Materials for farming                           | Minor | All the materials like bamboo pole/casuarina pole/ropes/braider/ fish net/ anchor/ floats/ knife shall be kept in defined locations facilitating easy operation.                                                                                                                                                                                                                                                              | Visual inspection and interview with farmers   |



|              |                                               |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                     |
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| <b>vii)</b>  | <b>TRAINING</b>                               |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                     |
| a)           | Training to farmers                           | Minor | Farmers shall attend periodic training conducted by research organizations/ fisheries department to update the new knowledge, latest operational protocols, good management practices, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Verification of records and interview with farmers. |
| <b>viii)</b> | <b>TRANSPORT</b>                              |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                     |
| a)           | Transportation of seed and harvested seaweeds | Minor | <p>a) A designated place near seashore for loading and unloading shall be identified. Standard operating procedures for packing of seeds and harvested seaweeds shall be followed.</p> <p>b) If seedlings are taken from other districts/states, it shall be placed in a clean net bag and kept at bottom (1-2m depth) of the sea for few days before planting.</p> <p>c) Jute gunny bags which can hold 50 kg of seaweed seed materials are selected. They are soaked in clean seawater and fresh seaweed materials are stocked inside the gunny bags. The bags are sealed and transported either through road/ train/airways. Up to 48 hours, the seaweed seed materials may be transported without any loss.</p> <p>d) Harvested seaweeds shall be dried, and packed in clean sacks and transported.</p> <p>e) Seaweeds either in dry or wet forms are transported to the industries for commercial use. Moisture of dried seaweed shall be maintained between 30-35%.</p> | Verification of records and visual inspection       |

|            |                     |       |                                                                          |                         |
|------------|---------------------|-------|--------------------------------------------------------------------------|-------------------------|
| <b>ix)</b> | <b>TRACEABILITY</b> |       |                                                                          |                         |
| a)         | Traceability        | Major | Record shall be maintained for seaweed culture for traceability purpose. | Verification of records |