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PHILIPPINE NATIONAL STANDARD

PNS/BAFS 112:2016
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Organic Aquaculture

DEPARTMENT OF AGRICULTURE
PHILIPPINES

BUREAU OF AGRICULTURE AND FISHERIES STANDARDS
BPI Compound Visayas Avenue, Diliman, Quezon City 1101 Philippines
Phone (632) 920-6131; (632) 455-2856; (632) 467-9039; Telefax (632) 455-2858
E-mail: bafpsda@yahoo.com.ph
Website: www.bafs.da.gov.ph

Final Draft PNS
After TWG Meeting
March 7, 2016

Foreword

The Philippine National Standard (PNS) for Organic Aquaculture (PNS/BAFS 112:2016) was originally prepared and adopted in 2012. Organic aquaculture encourages polyculture production system, promotes the use of indigenous/endemic species under the extensive and semi-intensive culture systems, reduces/minimizes inputs of artificial ingredients, prohibits the use of genetically modified organisms (GMOs), and considers ecological conditions necessary for sustainable aquaculture production.

The PNS for Organic Aquaculture was revised by the Technical Working Group (TWG) organized by the Bureau of Agriculture and Fisheries Standards (BAFS) through a Department of Agriculture (DA) Special Order No.476, Series of 2015. The TWG is composed of members representing the Bureau of Fisheries and Aquatic Resources (BFAR), Organic Certification Center of the Philippines (OCCP), Southeast Asian Fisheries Development Center Aquaculture Department (SEAFDEC-AQD), Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD) and Central Luzon State University (CLSU). This PNS was presented and reviewed during the consultative meetings with the concerned stakeholders in Region I (Pangasinan) and Region XI (Davao City). Comments gathered during the consultations were carefully evaluated by the TWG and included accordingly in the final version of this standard.

The revision of the PNS was undertaken in order to achieve equivalence with the existing Codex standard – Guidelines for the Production, Processing, Labelling and Marketing of Organically Produced Foods (GL 32-1999) and its future amendment, and takes into consideration the new developments and inclusion of the identified potential species for organic aquaculture. This PNS identifies minimum requirements on documentation, conversion to organic aquaculture, parallel production, selection of site, interaction with surrounding ecosystem, organic fertilization, aquatic plants, aquatic animal sources/origin, breeding and hatchery management, aquatic animal nutrition and feeding, aquatic animal health and welfare, harvesting, post-harvest handling, transport and processing, storage, and social aspects.

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1 Scope

The Philippine National Standard for Organic Aquaculture establishes the guidelines for the operation of organic aquaculture in different aquatic environments (fresh, brackish and marine) and the production of quality fishery products that are safeguarded from contamination of harmful and toxic chemical substances and use of artificial ingredients, from pre-production to marketing to enhance food safety for human consumption and to provide options to consumers/markets.

This Standard focuses on minimum requirements for the management of aquatic animals and plants in order for the product to be labeled as Certified Organic.

2 References

The titles of the publications referred to in this Standard are listed in the inside back cover.

3 Definitions

For purposes of this Standard, the following definitions shall apply:

3.1
aquaculture[1]
fishery operation involving the breeding and farming of fish and fishery species in fresh, brackish and marine water areas

3.1.1
freshwater aquaculture
fishery operation involving the raising and culturing of fish in a water body originating from lakes, reservoirs, streams and rivers having a salinity from 0 to 0.5 parts per thousand

3.1.2
brackishwater aquaculture
farming of aquatic plants and animals in confined waters along the shoreline where the salinity maybe highly variable within each year from near freshwater during rainy season up to seawater or even higher during dry season

3.1.3
mariculture
farming of aquatic plants and animals in unconfined open waters of the sea including bays, coves and estuaries regardless of actual salinity level or depth

3.1.4
extensive aquaculture system
known as traditional aquaculture, low stocking density (Annex 1),depend basically on available natural food in the culture facility

[1] The terms breeding, farming, raising and culturing in the definitions of aquaculture are synonymous

3.1.5
semi-intensive aquaculture system
higher stocking density (Annex 1), depend on natural food which is increased over baseline levels by fertilization and use of supplementary feed

3.2
aquatic plants
plants that must grow in water whether rooted in the mud or floating without anchorage, plants that must complete part or all of their life cycle in or near the water

3.2.1
macroalgae/seaweed
any of a large number of marine benthic algae. They are macroscopic, multicellular, and macrothallic, in contrast to most other algae

3.2.2
microalgae
small microscopic aquatic photosynthetic plants. Microalgae are also called phytoplankton

3.3
artificial ingredient
synthetically produced or are found in nature but manufactured artificially and produced more economically, with greater purity and more consistent quality, than their natural counterparts

3.4
biodiversity
variety of life forms and ecosystem types on Earth. Includes genetic diversity (i.e. diversity within species), species diversity (i.e. the number and variety of species) and ecosystem diversity (total number of ecosystem types)

3.5
carrying capacity
maximum size of population of a given species that can be supported in a given area or volume of a body of water which will not lead to the deterioration thereof

3.6
certification
procedure by which Organic Certifying Bodies (OCB) provide written or equivalent assurance that foods or food control systems conform to requirements or standards of the NOAB

3.7
competent authority
official government agency having jurisdiction

3.7
conventional aquaculture
farming systems using artificial feeds, inorganic fertilizers and/or pesticides or failing to conform to this standard in any other way

3.8
conversion
act of changing an aquaculture system from traditional/conventional to organic. This covers what is sometimes known as transition

3.9
conversion period
time between the start of the organic management and the certification of aquaculture products as organic

3.10
ecological footprint
a calculation that estimates the area of the Earth's productive land and water required to supply the resources than an individual or group demands, as well as to absorb the wastes that the individual or group produces

3.11
endemic species
species restricted or native to a particular region

3.12
exotic species
species that are introduced or non-native; foreign

3.13
genetically modified organisms (GMOs)
organisms that possess a novel combination of genetic materials obtained through the use of modern bio-technology

3.14
homeopathic treatment
treatment of disease based on administration of remedies prepared through successive dilutions of a substance that in larger amounts produces symptoms in healthy subjects similar to those of the disease itself

3.15
indigenous species
species that are native and occur naturally to a number of places at once

3.16
inoculums
cells used in an inoculation, such as cells added to start a culture

3.17
licensing
process of approval of an application to operate or establish an establishment prior to engaging in the manufacture, importation, exportation, sale, offer for sale, distribution, transfer, and where applicable the use, testing, promotion, advertisement, and/or sponsorship of products

3.18
official accreditation
procedure by which DA-BAFS having jurisdiction over OCB formally recognizes the competence of an inspection and/or certification body to provide inspection and certification services. Official Accreditation is issued by DA-BAFS.

3.19
organic
particular farming and processing systems, described in the standards and not in the classical chemical sense. The term "organic" is synonymous in other languages to "biological" or "ecological"

3.20
parallel production
any production where the same unit is growing, breeding, handling or processing the same products in both a certified organic system and a non-certified or non-organic system. A situation with "organic" and "in conversion" production of the same product is also parallel production. Parallel production is a special instance of split production

3.21
polyploid organism
organism having more than the diploid number of chromosomes

3.22
registration
process of approval of an application to register products prior to engaging in the manufacture, importation, exportation, sale, offer for sale, distribution, transfer, and where applicable, the use, testing, promotion, advertisement, and/or sponsorship of products

3.23
standards
norms, sets of guidelines, requirements and principles that are used as in organic aquaculture and processing. The term "standards" as used here refers to Philippine National Standards for Organic Aquaculture relevant to local aquatic ecosystems production

3.24
sustainable aquaculture
management of aquaculture and the orientation of technological and institutional change to ensure the attainment and continued satisfaction of human needs for present and future generations

3.25
veterinary drugs
any substance applied or administered to any food-producing animal, such as meat or milk-producing animals, poultry, fish or bees, whether used for therapeutic, prophylactic or diagnostic purposes or for modification of physiological functions or behaviour.

4 General principles

4.1 Organic aquaculture is a strategic approach to develop and manage farms in a manner that conforms to the ecosystem approach by integrating aquaculture within the wider ecosystem to promote sustainability.

4.2 It is carried out in such a manner that produces the least effect on local biological and ecological processes and promotes environmental integrity.

4.3 It complies with all fishery and related environmental laws, such as FAO Code of Conduct for Responsible Fisheries, FAO Aquaculture Certification Guidelines, EU Commission Regulation (EC) No. 710/2009 and other related international guidelines, Code of Aquaculture Practices (BFAR FAO 214) and social/ ethical standards including but not limited to applicable HACCP principles in aquaculture.

4.4 It ensures the integrity of organisms from source until its final destination, minimizing inputs using artificial ingredients and prohibiting genetically modified organisms (GMOs).

4.5 It strives to preserve the endemic species while exercising utmost precaution in the introduction of exotic ones.

4.6 It promotes the health and welfare of the organisms by minimizing stress, reducing/eradicating the incidence of disease, and trying to meet their physiological and behavioural needs.

4.7 It promotes a safe, healthy and sustainable working environment for workers.

4.8 It integrates sound and adequate systems of documentation and tracking for purposes of traceability.

5 Minimum requirements

Practices for organic aquaculture shall meet the following requirements:

5.1 Documentation

Organic aquaculture management plan that describes in detail:

5.1.1 Suitability of the site, site description, health condition of immediate marine habitats and available information on ecological footprint and carrying capacity of the resource system;

5.1.2 Farm size, design and layout and source of water;

5.1.3 Water management;

5.1.4 Location of adjacent conventional fish farms and potential sources of contaminants;

5.1.5 Biodiversity conservation;

5.1.6 Pre-production and production system (broodstock and fry selection, production calendar, pond preparation, fertilization, control of predators, etc.);

5.1.7 Production targets;

5.1.8 Inputs used, quantity and sources applied per unit area or volume;

5.1.9 Management of aquaculture stock per production cycle as determined by the competent authority for every production unit:

a. Stocking and harvest [stocking density based on species and culture system (Annex 1), average body weight, survival rate and volume of production per unit area or volume];

b. Feed type and feeding management [frequency, rate and target feed conversion ratio (FCR)];

c. Record and probable cause of mortality during the culture period; and

d. Cleaning agents and disinfectants used (chemical type, product name, quantity and duration/frequency of use).

5.1.10 Fish health management (disease occurring in the locality and disease management practice employed);

5.1.11 Biosecurity measures to insulate the organic system from contamination risks;

5.1.12 Harvest and post-harvest practices;

5.1.13 Transport, storage facilities and storage practices;

5.1.14 Past use of the site with respect to waste, sediments and water quality; and

5.1.15 Applicable laws and existing regulations especially those pertaining to mangrove protection and reforestation and fisheries conservation.

5.2 Conversion to organic aquaculture

5.2.1 Conversion period from extensive, semi-intensive and intensive culture systems shall be at least one (1) production cycle subject to the condition of the pond.

5.2.2 In cases where the water has been drained and the facility cleaned and disinfected with permitted cleaning materials a conversion period is not required, subject to the result of the laboratory analysis. During the conversion period the stock should not be subject to treatments or exposed to products which are not permitted for the production of organic foods.

5.2.3 Operators should make sure that conversion to organic aquaculture addresses environmental factors, and past use of the site with respect to waste, sediments and water quality.

5.2.4 Before products from a farm can be certified as organic, inspection shall have been carried out during the conversion period.

5.2.4 An inspection is required before an individual farmer or enterprise shall be granted a certificate. An initial assessment may be required to determine if the farm is compliant to organic aquaculture standards. If the farm meets the minimum requirements, the inspection and certification processes can proceed. The length of the conversion period shall be based on the results of the pre-assessment. During the conversion period, products cannot be sold as certified organic but as products as in conversion.

5.2.5 Once the conversion production cycle has been completed in a single unit, subsequent production cycles in the same, or different units may be developed as certified organic, provided an application is made, all standards are adhered to, and records are kept for inspection.

5.3 Parallel production

5.3.1 In open water systems, conventional and organic production units must be well separated by a minimum of 50 meters, provided no direct current flow or tidal influence should be considered in the positioning of both installations to avoid water effluent or direct contamination.

5.3.2 For land-based installations, there must be physical barriers such that water cannot circulate between organically certified and conventional units.

5.3.3 Feed and other input supplies for the different production methods must be clearly labeled and separated with physical barriers such as partition or wall.

5.3.4 Preparation of farm-made feeds for the different production methods should be kept separated in terms of space and/or time.

5.3.5 If a unit is switched from organic to conventional management at any point in the growing cycle, the affected organisms cannot be sold as organic.

5.3.6 Adequate documentation must be available for inspection for both production systems.

5.3.7 There should be a dedicated farm manager/personnel for certified organic farms.

5.4 Selection of site, interaction with surrounding ecosystem

5.4.1 Compliant to applicable environmental and fishery laws and existing regulations such as, but not limited to the Bureau of Fisheries and Aquatic Resources' (BFAR) Fisheries Administrative Order (FAO) 214: Code of Practice for Aquaculture, Sec. 2. Site selection/evaluation.

5.4.2 In case of installation of new or improvement of already existing projects/farms, this shall not cause irreversible damage to natural vegetation in the area. On the contrary, conservation and reforestation of mangroves is encouraged where applicable.

5.4.3 For open water environments the prevailing natural ecological balance shall remain significantly undisturbed and the natural populations are not endangered.

5.4.4 Water sources shall have minimal or no contaminants such as antibiotics, bio-contaminants, heavy metals, hormone disrupting chemicals, pesticides, and radioactive substances[2] (Annex 2), as determined through testing at least once a year or every renewal of the organic certification.

5.4.5 Aquatic ecosystems shall be managed to comply with relevant requirements of organic ecosystems[3].

5.4.6 Operators shall take adequate measure to prevent escapes of introduced or cultivated species and document any that are known to occur.

5.4.7 Water discharged from farming operation shall be treated or managed to prevent excessive nutrient build up either on or off site to the operation in compliance to the Department of Environment and Natural Resources (DENR) Administrative Order No. 35 s. 1990 – Revised Effluent Regulations of 1990, Revising and Amending the Effluent Regulations of 1982.

5.4.8 A treatment or settling pond is recommended for land-based organic farms for water that will be directly discharged to open waters.

5.4.11 All equipment shall be regularly maintained to ensure its structural integrity and this information should be properly recorded.

5.4.12 The use of life support system will be allowed within the limit of semi-intensive system. in consistent with the Stocking Density

5.4.13 An organic aquaculture farm/project shall preferably be constructed in areas upstream of the water source.

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[2] Based from the European Atomic Energy Act as cited by European Nuclear Society radioactive substances are:

a. nuclear fuels, i.e.
   i) plutonium 239 and plutonium 241,
   ii) uranium enriched with the isotopes 235 or 233,
   iii) any substance containing one or several of the substances mentioned in a) and b),
   iv) substances which can be used in a suitable plant to maintain a chain reaction which initiates its own repetition and which are determined in an ordinance having the force of law.
b. other radioactive substances which - without being nuclear fuel -,
   i) spontaneously emit ionizing rays,
   ii) contain one or several of the substances mentioned in a) or are contaminated with such substance
c. at least five percent of the perimeter ("land-water interface") area shall have natural vegetation.

[3] Based from IFOAM standard for organic ecosystem, a farm should place appropriate areas under its management in wildlife refuge habitat. These include:

a. waterways, pools, springs, ditches, floodplains, wetlands, swamps and other water rich areas which are not used for intensive agriculture or aquaculture production;
b. areas with ruderal flora; and
c. wildlife corridors that provide linkages and connectivity to native habitat.

5.4.14 Rearing units on land shall meet the following conditions: [4]

a. for flow-through systems it shall be possible to monitor and control the flow rate and water quality of both in-flowing and out-flowing water;

5.5 Organic fertilization

The application of organic material as fertilizer must comply with the Philippine National Standard for Organic Fertilizer (PNS/BAFS 40:2013) or must seek prior approval from the accredited certifying body.

5.6 Aquatic plants

5.6.1 Aquatic plant production shall comply with the relevant requirements of organic ecosystems and crop production.

5.6.2 Distance of contamination sources, whether chemical, biological or radioactive, shall be assessed at the time of inspection.

A. Seaweed *(Kappaphycus spp., Eucheuma spp., Gracilaria spp., etc.)*

5.6.3 Seaweed shall be grown in areas that satisfy the minimum requirements for growth. In addition to this:

a. sustainable practices shall be used in all stages of production, from collection of seaweed propagules to harvesting; and
b. to maintain good quality planting materials, the collection in the wild should be done in a sustainable manner.

B. Microalgae *(Spirulinaspp.,Chlorellaspp., Dunaliellaspp., etc.)*

5.6.4 Seawater used for microalgae culture should be free of other organisms that may compete with the microalgae, such as other species of phytoplankton, phytophagous zooplankton, or bacteria.

5.6.5 Only physical sterilization such as filtration, autoclaving, pasteurization, UV treatment for seawater is allowed.

5.6.6 Algae can be cultured in controlled water systems and photo bioreactors (such as tanks, polyethylene sleeves or bags, glass or plastic tubes).

5.6.7 Algal inoculum or seed for new culture shall be sourced from algal production.

5.7 Aquatic animal sources/origin

5.7.1 Indigenous species in the country/locality shall be preferred.

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[4] Based from the EC No. 710/2009, Article 25g 2

5.7.2 Aquatic animals shall be raised organically from hatching.

5.7.3 If organic animals are not available, animals from registered hatcheries can be used, provided that they spend the last two thirds of their life span in the organic system.

5.7.4 Operators shall not utilize polyploid organisms or monosex stock or stock having undergone sex reversal resulting from hormonal treatment and/or genetic engineering/ manipulation.

5.7.5 Wild larvae of fish and crustacean shall be allowed for stocking when there is a passive in flow when the ponds or other aquaculture constructions are refilled. Mollusk larvae are also allowed for stocking if they have settled on substrate which has been specially introduced for this purpose.

5.7.6 Post larvae/juveniles of fish, mollusk and crustacean collected in the wild shall also be allowed for stocking and raising using organic methods.

5.8 Breeding and hatchery management

5.8.1 The Competent Authority should decide whether or not to approve closed recirculation systems. The use of life-support systems after a thorough examination and evaluation of the total environmental viability and compatibility with organic production.

5.8.2 Breeding should reflect the natural environment as closely as possible, in terms of ambient conditions appropriate for the type of species. Manual sorting/sexing or selection, stripping of gametes and incubation of eggs are allowed.

5.8.3 For natural reproduction or spawning, the use of fresh pituitary gland, even from the same species is not allowed except for species such as catfish, including *pangasius spp.,* and carp that do not spawn naturally in captivity.

5.8.4 Broodstock shall come from a registered organic hatchery.

5.8.5 Wild sourced broodstock shall also be allowed in accordance with BFAR regulations.

5.8.6 Hatcheries shall be registered by BFAR.

5.9 Aquatic animal nutrition and feeding

5.9.1 Animals shall be fed organic feed.

a. Operators may feed a limited percentage of non-organic feed under specific conditions for a limited time in the following cases:

    i) Inadequate quantity or quality of organic feed only during first one third culture period of the species);

    ii) Areas where organic aquaculture is in early stages of development.

In no case may the percentage of non-organic feed of agricultural origin exceed 20**%** dry matter calculated on per production cycle basis.

b. Operators may use non-organic aquatic animal protein and oil sources provided they:

   i) shall be harvested from independently verified sustainable sources;

   ii) shall be verified to have contamination levels below limits established by the standard-setting body, and

   iii) shall not constitute 100% of the diet.

c. The standard-setting or certifying body shall set the following:

   i) appropriate percentage requirement of organic ingredient as diet;

   ii) implementation date for requiring at least 50**%** of diet be of organic ingredients.

5.9.2 The following substances are prohibited in the diet:

a. farm animal by-products (e.g. abattoir waste) of ruminants;

b. slaughter products of the same species;

c. all types of excrements including droppings, dung or other manure;

d. feed subjected to solvent extraction (e.g. hexane) or the addition of other chemical agents;

e. amino-acid isolates;

f. urea and other synthetic nitrogen compounds;

g. synthetic growth promoters or stimulants;

h. synthetic appetite stimulants;

i. artificial preservatives; and

j. artificial coloring agents.

k. use of wild fish juveniles as ‘trash fish’

5.9.3 Synthetic vitamins, minerals and supplements may be used when natural sources are not available.

5.9.4 Feed containing genetically modified organisms (GMO) or their products are not allowed.

5.9.5 Feeding of natural pigments (e.g. in the form of shrimps shells or *Phaffia* yeast) is permitted. This must be limited to the degree of pigmentation found under natural circumstances.

5.9.6 The diet for aquatic animals shall meet the nutritional requirements of the species.

5.9.7 Feed applied shall promote the natural feeding behaviour of the species and shall be calculated as per body weight requirement to minimize excess feeds that may pollute the environment.

5.9.8 The use of wild fish juveniles as 'trash fish' for aquaculture feeds shall not be allowed.

5.10 Aquatic animal health and welfare

5.10.1 In any production system where use of antibiotics or other prohibited treatments may be necessary, treated stock must be withdrawn from the organic production stream and may only be marketed as conventional product.

5.10.2 In case of disease outbreak, the use of veterinary drugs should be limited to two courses of treatment per production cycle, with the exception of vaccines and compulsory eradication schemes. If the specified limits are exceeded the aquaculture animals concerned should not be sold as organic.

5.10.3 Use of synthetic hormones, growth promoters or growth-enhancing substances as well as other synthetic feed additives (e.g. synthetic amino-acids, chemo-synthetic pigments) to artificially stimulate growth or reproduction shall be prohibited.

5.10.4 Disease and pest control shall take the form of proactive best/good management practices. In the event of critical (non-routine) prohibited input use, stocks in the treated sections shall no longer be certified as organic. Treatment with prohibited substances shall not affect certification of the entire operation but only in instances where no transmission occurs to other stocks.

5.10.5 Emergency harvest must be considered as an alternative action or method to avoid use of drug treatment. Harvest shall be marketed as a conventional product if fit for human consumption.

5.10.6 When treatment is necessary, the use of natural methods and medicines must be first choice. Disease treatment must be carried out at once/immediately so that it minimizes harmful effects on the environment and the animals' health.

5.10.7 Permitted treatments may be used as prophylactics or routine but within the framework of statutory regulations such as:

(i) use of natural physical methods (in particular drying out, freezing out);

(ii) use of non-residue building, inorganic compounds e.g hydrogen peroxide (H_2O_2), common salt (NaCl), lime ($CaCO_3$), quicklime (CaO), calcium hydroxide [$Ca(OH)_2$], sodium hypochlorite (NaOCl);

iii) use of naturally occurring, non-residue building organic compounds (e.g. per-acetic acid, citric acid, formic acid, alcohol);

iv) use of naturally occurring plant substances (in particular *Labiate* and *Allium* species; rotenone from *Derris spp*., *Lonchocarpus spp.* or *Tephrosia spp*.; saponin from Camella; extracts from *Azadirachta indica* (neem tree), oil emulsions (free of synthetic chemical insecticides) on the basis of paraffin oils, mineral oils and vegetable oils, pyrethrum extracts from *Chrysanthemum cinerariaefolium* (synthetic pyrethroids and synergists are prohibited) and quassia from *Quassiaamare*;

v) preparations of viruses, fungi and beneficial bacteria (e.g. *Bacillus thuringensis*) and other forms of probiotics; and

vi) use of homeopathic products.

5.10.8 The stock shall be regularly inspected with respect to its status of health. Dead organisms shall be removed from the holding system immediately.

5.10.9 Operators shall manage the operation and routinely monitor water quality, stocking densities, health and behavior of stock.

5.10.10 Certified organic fish shall not come in contact with uncertified stock during their life cycle.

5.10.11 Construction material of tanks, dams or cages shall not pose contamination risks to stock and shall enable the species in question to satisfy its natural behavioral patterns in the culture environment.

5.11 Harvesting, post-harvest handling, transport and processing

5.11.1 Existing applicable provisions of OIE, EC and CODEX shall be followed.

5.11.2 Harvest of aquatic plants shall not disrupt the ecosystem or degrade the collection area or the surrounding aquatic and terrestrial environment.

5.11.3 Harvesting shall have minimal negative impact on other natural species.

5.11.4 Harvesting, handling and transporting of live organisms must be done with minimal stress and injury to the organisms and must meet species-specific physiological needs.

5.11.5 Good water quality must be maintained during transport. Live organisms must be secured and overcrowding avoided.

5.11.6 Post-harvest handling and processing must follow the standards for post- harvest hygiene and handling practices to maintain the quality of the product. The use of synthetic preservatives must not be allowed.

5.11.7 Water and ice used must be of good quality and meet the public health standard.

5.11.8 Operators must ensure that equipment/method used to stun/shock animals is sufficient to produce numbness and/or kill the organism.

5.11.9 Transportation equipment and/or materials must comply with the existing national and international regulation with respect to environmental considerations and must not contaminate the product.

5.12 Storage

5.12.1 Organic and conventional aquaculture products must be stored separately to avoid co-mingling.

5.12.2 Inputs and equipment storage facilities must be well-ventilated and always kept thoroughly pest-free and clean from decaying wastes, slime and foul smell.

5.12.3 Only recommended disinfectants (Annex 3) and clean water must be used in cleaning storage facilities and equipment.

5.13 Social aspect

5.13.1 The employment of women and minors must be in accordance with current labor standards.

5.13.2 Wages/salaries and benefits must comply with the rates prescribed by the Regional Tripartite Wages and Productivity Boards (RTWPB) of the Department of Labor and Employment (DOLE).

5.13.3 Employment of minors in hazardous activities must be prohibited.

5.13.4 Wage discrimination because of age and gender must be prohibited.

5.13.5 Organic farms shall demonstrate equal rights for land and water use, not deny local communities access to public mangrove areas, fishing grounds and public resources.

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Annex 1

Stocking Density Based on Species and Culture Systems[5]

Species	Stocking Density (Grow-out)	Culture System	Remarks
1. Milkfish, *Chanos chanos*	Pond: 3,000 to 5,000 pcs/ha	Extensive/Semi-intensive	-with large shallow pond units, tidal water exchange, natural food, minimal use of fertilizer alternating with organic feed and other inputs
	Pen: 5,000 to 10,000 pcs/ha	Extensive	-with supplemental organic feed
	Cage: 10 to 30 pcs/m^3	Semi-intensive	- with organic feed
2. Nile Tilapia, *Oreo chromis niloticus*	Pond: 1 to 4 pcs/m^2	Extensive/Semi-intensive	with supplemental organic feed
	Cage: 10to 35 pcs/m^3	Semi -intensive	with supplemental organic feed
3. Striped Catfish, *Pangasius hypophthalmus*	Pond: 1 to 4 pcs/m^2	Extensive/semi-intensive	with supplemental organic feed
4. Bighead Carp, *Hypophthalmichthys nobilis*	10,000 pcs/ha	Polyculture in alternate cropping w/ milkfish in ponds	-as major species
	5,000 pcs/ha	Polyculture in alternate cropping w/ milkfish in pens	-as secondary species, depending on the size and fertility of the water body
5. Giant Gourami	1-2pcs/m^2	In ponds	with supplemental organic feed
6. Common Carp	1-2 pcs/m^2	In ponds	
7. Orange Spotted Grouper, *Epinephelus coioides* Snapper and Seabass	Pond: 500 to 1,000 pcs/ha (~6 cm TL)	Polyculture with *Tilapia (Oreochromismos sambicus)*	with supplemental organic feed
	Cage: 5 to 10 pcs/m^3	Semi-intensive	with supplemental organic feed

Annex 1 (Cont…)

8. Giant Tiger Prawn, *Penaeus monodon*	2 pcs/m^2	Extensive	with supplemental organic feed
9. Giant River Prawn, *Macrobrachium rosenbergii rosenbergii and M. rosenbergii dacquetti*	1to 3 pcs/m^2	Extensive / Polyculture w/Tilapia	with supplemental organic feed
	4 to 7 pcs/m^2	Semi-intensive	with supplemental organic feed
10. White leg Shrimp, *Litopenaeus vannamei*	4 to 10 pcs/m^2	Extensive	with supplemental organic feed
	10 to 30 pcs/m^2	Semi-intensive	with supplemental organic feed
11. Mangrove Crab *Scylla serrata* *S. olivacea* *S. tranquebarica*	500-2000pcs/ha	Polyculture with milkfish and Grouper juvenile in pond	with supplemental organic feed
12. *Siganid spp* *Siganus guttatus* *S. vermiculatus*	Pond: 1000-2000 pcs/ha	Polyculture with milkfish and shrimps in pond	with supplemental organic feed
	Cage: 0.5-1pc/m^3	Polyculture with milkfish	with supplemental organic feed
	Cage 5pcs/m^3	monoculture	with supplemental organic feed

[5] Based from Food and Agriculture Organization of the United Nations (FAO) Fisheries and Aquaculture Department 2011 – Cultured Aquatic Information Programme (http://www.fao.org/fishery/culturedspecies/search/en); and Bureau of Fisheries and Aquatic Resources, Department of Agriculture (BFAR-DA).

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Annex 2

Water Quality Criteria for Pollutants, Toxic and Other Deleterious Substances for Fresh, Coastal and Marine Waters (For the Protection of Public Health)[6]

PARAMETER (Maximum Limits)	UNIT	FRESHWATERS		COASTAL & MARINE WATERS			
		Class C	Class D	Class SA	Class SB	Class SC	Class SD
Arsenic[(a)]	mg/L	0.05	0.1	0.05	0.05	0.05	--
Cadmium[(a)]	mg/L	0.01	0.05	0.01	0.01	0.01	--
Chromium[(a)](hexavalent)	mg/L	0.05	0.1	0.05	0.1	0.1	--
Cyanide	mg/L	0.05	--	0.05	0.05	0.05	--
Lead[(a)]	mg/L	0.05	0.5	0.05	0.05	0.05	--
Total Mercury[(a)]	mg/L	0.002	0.002	0.002	0.002	0.002	--
Organo-phosphate	mg/L	Nil	Nil	Nil	Nil	Nil	--
Aldrin	mg/L	--	--	0.001	--	--	--
DDT	mg/L	--	--	0.05	--	--	--
Dieldrin	mg/L	--	--	0.001	--	--	--
Heptachlor	mg/L	--	--	Nil	--	--	--
Lindane	mg/L	--	--	0.004	--	--	--
Toxaphane	mg/L	--	--	0.005	--	--	--
Methoxychlor	mg/L	--	--	0.10	--	--	--
Chlordane	mg/L	--	--	0.003	--	--	--
Endrin	mg/L	--	--	Nil	--	--	--
PCB	mg/L	--	--	0.001	--	--	--
Surfactants (MBAS)	mg/L	0.05	--	0.2	0.3	0.5	--
Oil/Grease (Petroleum Ether Extract)	mg/L	2	5	1	2	3	5
Phenolic Substances as Phenols	mg/L	0.02[(b)]	--	nil	0.01	(b)	--
Total Coiliforms	MPN/100ml	5000[(c)]	--	70[(c)]	1000[(c)]	1000[(c)]	--
Fecal Coliforms	MPN/100ml	--	--	nil	200[(c)]	--	--
Copper	mg/L	0.05[(e)]	--	--	0.02[(d)(e)]	0.0[(e)]	--

Legend:

Class C – fishery water for the propagation and growth of fish and other aquatic resources.

Class D – other inland waters, by their quality, belong to this classification.

Class SA – waters suitable for the propagation, survival and harvesting of shellfish for commercial purposes.

Annex 2 (Cont…)

Class SB – fishery water Class I (spawning areas for *Chanos chanos or Bangus*and similar species).

Class SC – fishery water class II (commercial and sustenance fishing).

Class SD – other coastal and marine waters, by their quality, belong to this classification.

(a) – do not apply if natural background is higher in concentration. The latter will prevail and will be used as baseline.

(b) – not present in concentrations to affect fish flavor/taste.

(c) – these values refer to the geometric mean of the most probable number of coliform organism during a 3-month period and that the limit indicated shall not be exceeded in 20 percent of the samples taken during the same period.

(d) – for spawning areas of *Chanoschanos* and other similar species.

(e) – limit is in terms of dissolved copper.

nil – extremely low concentration and not detectable by existing equipment.

-- - means the standard of these substances are not considered necessary for the present time, considering the stage of the country's development and DENR capabilities, equipment and resources.

[6] Based from Department of Environment and Natural Resources (DENR) Administrative Order No. 34 s. 1990 (March 20, 1990). Revised Water Usage and Classification/Water Quality Criteria Amending Section Nos. 68 and 69, Chapter III of the 1978 NPCC Rules and Regulations.

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Annex 3

Recommended Disinfectants and Their Use[7]

DISINFECTANT	SURFACES	CONCEN-TRATION	CONTACT TIME	DISPOSAL	PROS AND CONS
A. Low Level Disinfectants: Kill most vegetative bacteria, some fungus, some enveloped viruses, do not kill mycobacteria or bacterial spores.					
Benzalkonium chloride (QAC)	Plastics, floors, counter tops	500 ppm	10 min (except as noted)	unknown	**Pros:** easily accessible, non-corrosive **Cons:** highly toxic to fish, disposal issues, not labeled for aquatic use, bath type use
Didecyl dimethyl ammonium chloride (QAC)	Plastics, floors, counter tops	400 ppm	5 min (except as noted)	unknown	**Pros:** non-corrosive, no rinse spray on **Cons:** disposal issues, hard to find, not labeled for aquatic use
Phenols (Lysol, Pinesol)	Hard surfaces		15 min	unknown	**Pros:** common household products **Cons:** not labeled for use of field gear, irritating to skin, must rinse
B. Intermediate Level Disinfectants: Kill vegetative bacteria, most viruses and most fungi, but not resistant bacterial spores.					
Chlorine	All surfaces except plastics	200 – 500 ppm	10 – 60 min	neutralize with sodium thiosulfate	**Pros:** works well, inexpensive, readily available **Cons:** highly corrosive, odors, human toxicity
Virkon Aquatic	Waders, boots, boats, nets, all field gear	0.5 – 1%	5 – 30 min (except as noted)	dilute, pour on ground away from surface waters	**Pros:** non-corrosive, considered environmentally safe, biodegradable, can use as a no-rinse spray on **Cons:** cost, efficacy not determined for some pathogens

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DISINFECTANT	SURFACES	CONCEN-TRATION	CONTACT TIME	DISPOSAL	PROS AND CONS
B. Intermediate Level Disinfectants…					
Ethyl Alcohol	Hands, tools, counter tops	70 – 80%		unknown	**Pros:** readily available **Cons:** evaporates quickly and may not get proper contact time, expensive, not good for field equipment, fixes organics to hard surfaces, inactivated by sunlight, flammable
Isoprophyl Alcohol		60 – 80%	10 – 30 min (except as noted)		
Iodine	Better as antiseptic for tissues	100 – 250 ppm	20 – 30 min	Neutralize with sodium thiosulfate	**Pros:** antiseptic, inexpensive **Cons:** corrosive to metals, stains, long contact time, cannot over concentrate, highly toxic to aquatic animals
C. High Level Disinfectants: Destroy vegetative bacteria, mycobacteria (TB), fungi, enveloped (lipid or hydrophilic) and non enveloped virus (non lipid), but not necessarily bacterial spores. Must be capable of sterilization when contact time is extended.					
Hydrogen Peroxide		3 – 5%	5 min (except as noted)	unknown	**Pros:** can add to QACs and iodine to make them more effective **Cons:** destroys soft tissues when over exposed
Peroxigard		1:16		unknown	**Pros:** no-rinse spray on
Formaldehyde	Better when mixed with alcohol	1 – 3%		Titrations	**Pros:** easily accessible **Cons:** highly toxic, odors, personal protective gear required to protect applicator
D. Other Disinfection Options:					
Heat				NA	
Ozone		8 ppm	3 min		
pH		>12 or <4	>4 hr		
Complete Drying		>20°C			

[7] Source: American Fisheries Society (AFS) Fisheries Culture Section 2011. Guide to Using Drugs, Biologics and Other Chemicals in Aquaculture. AFS February 2011. (http://www.fishculturesection.org/DrugGuide/Files/GUIDE_FEB-2011.pdf)

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Department of Agriculture
Bureau of Agriculture and Fisheries Standards

Technical Working Group on the Development of Philippine National Standard for Organic Aquaculture

Dr. Nelson A. Lopez
Inland Fisheries & Aquaculture Division
Bureau of Fisheries and Aquatic Resources

Mr. Rene Geraldo G. Ledesma
National Fisheries Research Development Institute
Bureau of Fisheries and Aquatic Resources

Mr. Zaldy F. Hechanova
National Freshwater Fisheries Technology Center
Bureau of Fisheries and Aquatic Resources

Dr. Relicardo M. Coloso
Aquaculture Department
Southeast Asian Fisheries Development Center

Mr. Wilfredo C. Ibarra
Philippine Council for Agriculture, Aquatic and Natural Resources Research & Development
Department of Science and Technology

Ms. Leilani Ramona K. Limpin
Executive Director
Organic Certification Center of the Philippines

Dr. Adelaida L. Palma
National Inland Fisheries Technology Center
Bureau of Fisheries and Aquatic Resources

Florida E. Dieta
National Brackishwater Aquaculture Technology Center
Bureau of Fisheries and Aquatic Resources

Prof. Jose S. Abucay
College of Fisheries
Central Luzon State University

Secretariat

Bureau of Agriculture and Fisheries Standards

Ms. Karen Kristine A. Roscom
OIC – Executive Director

Mr. Mark F. Matubang
Senior Science Research Specialist

Dr. Gari Pellinor U. Hernandez
Science Research Specialist

Mr. Jaypee G. Trinidad
Research Assistant-II

Mr. Marco R. Abilar
Research Assistant-I

BUREAU OF AGRICULTURE AND FISHERIES STANDARDS

BPI Compound Visayas Avenue, Diliman, Quezon City 1101 Philippines
T/ (632) 920.6131 / 455.2856 / 467.9039
TF/ (632) 455.2858 / 456.6552
E-mail: bafpsda@yahoo.com.ph
Website: www.bafs.da.gov.ph