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Foreword

The Philippine National Standard (PNS) Code of Good Agricultural Practices (GAP) for Coconut intends to provide guidelines in the production and primary processing of coconut. The practices enumerated in the Standard are aimed towards prevention and reduction of risk occurrences, which include those of food safety, environmental impact, worker's health, safety, and welfare, and product quality.

As per the request of the Philippine Coconut Authority (PCA) to develop the Standard, the Bureau of Agriculture and Fisheries Standards (BAFS) created a Technical Working Group (TWG) authorized under Special Orders No. 605 and 683 Series of 2017.The TWG was composed of the following agencies, institutions, and groups: Food and Nutrition Research Institute (FNRI), Philippine Coconut Research and Development Foundation, Inc. (PCRDF), United Coconut Associations of the Philippines (UCAP), University of the Philippines Los Baños (UPLB), Laguna Cacao Farmers Association – Kaanib Majayjay, and Kaaniban ng Magniniyog sa Laguna.

This document was drafted in accordance with the editorial rules of the BPS Directives, Part 3.

1 Scope

This standard code of practice covers the general hygienic practices for the production and primary processing of coconuts cultivated for both industrial applications and human consumption. It applies for all the steps from farm establishment, planting material sourcing to harvesting of fresh young coconut (buko), makapuno, sap/toddy, and mature coconut fruits.

2 Normative references

The tiles of the standard publications referred to in this standard are listed on the inside back cover.

3 Terms and definitions

3.1
agricultural inputs
any incoming material (e.g. seeds, fertilizers, water, agricultural chemicals, plant support, etc.) used for the primary production of coconut

3.2
agricultural wastes
generally regarded as unwanted or unsalable materials produced from agricultural operations directly related to the growing of coconut and other crops or animals. It covers both biodegradable and non-biodegradable materials

3.3
appropriate government agency/competent authority
entity/agency that has the knowledge, expertise, and authority as designated by law

3.4
biological control
use of competing biologicals (such as insects, microorganisms and/or microbial metabolites) for the control of mites, pests, plant pathogens and spoilage organisms

3.5
biopesticide
pesticide that is manufactured from biological sources

3.6
cleaning
removal of soil, dirt, grease or other foreign matter

3.7
coconut

palm (*Cocos nucifera* L.) or its components, including its drupe or fruit which contains a unique range of oils, proteins, carbohydrates (including dietary fiber), sugars, minerals and water, and the aqueous effusion from the inflorescence

3.7.1
fresh young coconut (buko)
coconut fruit harvested 9 months from spathe opening, the meat (solid) is tender and water (liquid) has relatively sweet taste

3.7.2
makapuno
mutant coconut with soft endosperm which fills the nut cavity and contains little or no water

3.7.3
mature coconut
11 to 12-month old coconut

3.7.4
sap/toddy
sweet translucent liquid obtained from tapping of unopened inflorescence (spadix) of coconut

3.8
composting
process where organic materials are subjected to moisture, heat and microorganisms for a specified period to produce a product known as compost

3.9
contamination
unwanted presence in a commodity, storage place, conveyance, or container, of any material (including a regulated organism) that may pose a biosecurity risk

3.10
debris
stumps, felled palms, logs

3.11
farmer
any person that undertakes one or more of the following: cultivation, harvesting, and postharvest practices

3.12
fertigation
application of nutrients through irrigation

3.13

fertilizer
any substance – solid or liquid – or any nutrient element or elements – organic or inorganic – singly or in combination with other materials, applied directly to the soil for the purpose of promoting plant growth, increasing crop yield or improving their quality

3.14
hazard
biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health and environmental effect/s

3.15
Integrated Pest Management (IPM)
pest management approach that uses all available pest control methods including but not limited to judicious use of pesticides, to optimize a crop's ability to resist the pest with the least hazard to man and the environment

3.16
manure
animal excrement which may be mixed with litter or other material, and which may be fermented or otherwise treated

3.17
maturity index
indicator used to measure or predict the maturity of coconut for harvesting purposes

3.18
organic material
material originating from plants and animals and not from synthetic sources

3.19
pest
unwanted animal or plant that affects the production, quality and safety of fruit and vegetables – for example, insects, diseases, weeds, rodents and birds

3.20
pesticide
any substance or product, or mixture thereof, including active ingredients, adjuvants and pesticide formulations, intended to control, prevent, destroy, repel or mitigate directly or indirectly, any pest. The term shall be understood to include insecticide, fungicide, bactericide, nematicide, herbicide, molluscicide, avicide, rodenticide, plant regulator, defoliant, desiccant and the like

3.21
pesticide residue
any specified substance in food, agricultural commodities, or animal feed resulting from the use of a pesticide. The term includes any derivatives of a pesticide, such as conversion products, metabolites, reaction products, and impurities considered to be of toxicological significance

3.22
pre-harvest interval (PHI)
number of days between the last spraying and harvest. It is derived from a supervised pesticide residue trial where the pesticide is applied at the recommended rates and the residue levels are analysed. Each pesticide active ingredient (AI) has its own PHI

3.23
primary processing
preparation and/or transformation of a raw material for further processing

3.24
re-entry period
period of time immediately following the application of a pesticide during which unprotected farmers should not enter a field

3.25
risk
chance of something happening that will impact upon a hazard (for example, food safety). It is usually measured in terms of likelihood and severity

3.26
sensitive areas
areas at risk of environmental harm from chemicals, water, nutrients, waste, and so on, originating from property activity. Examples include biodiverse areas, other crops, livestock areas, water sources, marine areas, wetlands, native fauna and flora, soils, neighboring properties and public areas

3.27
site
defined area on the property – for example, a production site

3.28
soil additives
products or materials that are added to the soil to improve fertility, structure or control weeds. Examples are animal manure, sawdust, compost, seaweed, fish-based products

4 Recommended practices

4.1 Site selection and management

Coconut farms should be located in areas suitable for food production and processing, preferably with an altitude of not more than 600 meters above sea level for optimum growth. Optimum conditions for coconut production are found in Annex A.

Management of site activities conforms to country environmental legislation covering air, water, noise, soil, biodiversity and other environmental issues.

In the case of new site(s), the risk of causing environmental harm within or outside the site should be assessed for the proposed use. Risk assessment should consider the prior use of the site and potential impact of adjacent sites to the new site(s).

If results of the evaluation of the production or adjoining sites lead to the conclusion that potential hazard exist, the sites should be further evaluated through analysis and characterization of the identified contaminants.

If the contaminants are found to be at unacceptable levels, the site should not be used for production and primary processing until corrective or control measures are carried out.

Whenever remedial action is required to manage the risk, the action taken should be monitored to ensure that contamination of the produce is eliminated or kept within acceptable levels.

4.2 Farm planning and production site mapping

A production site map should be prepared to show the condition of the farm or how the farm is intended to be developed. It should indicate the topography and the locations of the following:

- coconut production area;
- primary processing area;
- intercropping and livestock integration (if applicable);
- sources of water used on the farm (well, reservoir, rivers, lakes, farm ponds, etc.);
- chemical pesticides and fertilizer storage and mixing areas;
- tools and equipment cleaning and disinfection areas;
- storage area for tools and equipment;
- water storage, distribution networks, drainage, and discharge points of waste water;
- solid waste disposal area;
- composting areas;
- toilet facilities and hand-washing areas; and
- property buildings, structures, and road networks.

Each production area, in case of multiple production areas in a site, should be identified by a name or code, and must be indicated in the property map.

All hazard and risk areas to humans should be clearly indicated.

All facilities and structures for coconut production should be properly designed, constructed, and maintained to minimize postharvest losses and risk of contamination. All premises should adhere to the guidelines set by the appropriate government agency.

4.3 Sourcing and selection of planting materials

4.3.1 General considerations

Aside from yield quantity and quality as basic considerations, varieties to be grown should be selected based on market requirements, farmer preference, and adaptability to the locality. Other considerations may include soil type and nutrient levels, water availability, prevailing temperatures and humidity, and pest and disease history.

For efficient chemical, water and other input utilization, planting materials may be selected based on their nutrient and water use efficiencies, and pests and diseases resistance.

The planting materials should be of high quality and shall be sourced from Philippine Coconut Authority (PCA) seed gardens and seed production centers, Bureau of Plant Industry (BPI) accredited nurseries, or commercial producers.

4.3.2 Sourcing and selection of seednuts

Proper sourcing and selection of quality seednuts must be done to ensure productivity of palms.

Seednuts should be sourced from selected mother palms of National Seed Industry Council (NSIC)-registered or PCA-recommended varieties. The list of PCA-recommended and NSIC-registered coconut varieties and the potential yield and basic traits of 10 PCA recommended coconut hybrids and cultivars are found in Annex B.

Mother palms are selected from a block or area of highly homogenous bearing palms producing an average of at least 1,500 nuts per ha (12 nuts/palm) every 45 days (or at least 2.5 tons copra/ha annually). The selected mother palms should have at least 40 full-sized nuts anytime of the year under ordinary farm conditions.

Seednuts must be disease-free, undamaged by insects and rodents, physiologically mature, without deep punctures or cuts, with water manifested by “sloshing sound” when shaken, ungerminated, and resembles the distinct appearance of the specific variety of the mother palm.

Seednuts are seasoned in shade, preferably soaked in water with perianth lobes removed prior to sowing in appropriately prepared seedbeds of appropriate nursery site. Seednuts should be set with the germ end at the top in either upright for tall varieties or tilted for dwarfs to ensure nut water contact with the haustorium.

Sown seednuts and seedlings are appropriately watered, weeded, inspected for disease and pest incidence. Seedlings are fertilized as recommended. Recommended fertilization program is found in Annex C.

Healthy and vigorous seedlings are selected for planting.

4.4 Farm establishment

Farm establishment involves thorough land preparation, proper field layout (orientation and spacing) and holing, and planting.

4.4.1 Land preparation

The extent of land preparation depends upon the soil and climatic condition of the site.

4.4.1.1 Situation

On slopes or other places where erosion is likely to occur, covercropping before planting time is advisable. Terraces constructed following the contour lines also minimize erosion (constructed in areas) where water is likely to stay for several days after rains. In water-logged areas, palms generally exhibit yellowing of all leaves, stunted growth, and poor yield.

4.4.1.2 Condition

If the land has been cleared and is under cultivation, no special advance preparation is necessary.

For idle lands, the area must be cleared first of bushes, shrubs, and grasses. When cogon (*Imperata cylindrica* L.) covers the ground entirely, land preparation by an animal-drawn plow or by a tractor (large area) is advantageous. Application of non-selective herbicide to prevent weed growth may be considered.

4.4.2 Field layout and planting

Field should be laid out in either square, triangular, rectangular, quincunx, or Group of 3 per Hill (G3pH) systems depending on the intended farm use and farmers' preference. The planting distance depends on the intended planting and cropping system to be used and is recommended to be from 8.0 to 10.0 meters. The longest distance between palms should be in the east-west orientation to optimize sun exposure or avoid overshadowing of palms throughout the day. The recommended planting systems and distance are shown in Annex D.

4.4.3 Planting and replanting of damaged palms

Seedlings should be appropriately planted in sufficiently wide and deep planting holes at the onset of the rainy season. Seedling collar shall not be covered with soil nor soil be allowed to get into the leaf axils.

Organic matter rich soil amendment should be applied prior to planting while protection of newly planted or young palms from stray animals should be provided.

Young palms that are deformed, stunted in growth, dead, and those exhibiting weakness should be replaced or replanted with seedlings of the same age.

4.5 Farm maintenance

Measures should be taken in order to ensure farm efficiency, productivity, and safety.

4.5.1 Soil and soil conservation

Coconut can thrive in a wide range of soil textures (sandy to clay). However, it prefers fertile and well-drained soils with a minimum depth of 75 cm and with high water-holding capacity. The palm tolerates soil pH from 5.0 to 8.0. For optimum growth, however, a pH range of 5.5 to 6.5 is ideal.

Recommended soil conservation measures such as minimum tillage, contour planting, crop rotation, covercropping, green manuring, and mulching should be integrated in the coconut production practices in order to improve or maintain the soil structure and tilth, and minimize soil compaction and erosion.

Use of crop suitability maps to plan for intercropping and livestock integration is encouraged.

4.5.2 Fertilizers and soil amendments

4.5.2.1 General requirements

To optimize nutrient use and minimize nutrient losses, the farm should apply the correct amount of fertilizers based on recommendations from soil analysis or leaf analysis. Fertilizers and soil additives should be judiciously selected to minimize the risk of contamination of coconut, particularly with the heavy metals. Only duly registered fertilizers (inorganic and bio/organic) should be used. List of banned and restricted fertilizers in the Philippines are found in Annex E.

The details of the source or supplier of all fertilizers and soil additives including potting mixes (e.g. coco peat, peat moss, rice hull, compost) used in the farm shall be documented.

Equipment used for the application of fertilizers and soil additives should be maintained in good working condition and should be checked regularly.

4.5.2.2 Organic fertilizer

The use of organic fertilizers, whether produced in the farm or sourced commercially, is encouraged. Composting areas for the production of farm-based organic fertilizers should be located away from processing and storage areas and from drinking and farm water sources. Production procedures, such as composting, solarization, and heat drying, should be designed to reduce or eliminate pathogens in manure, biosolids, and other natural fertilizers. On the other hand, commercially sourced organic fertilizers shall be obtained from registered suppliers.

Human sewage, whether processed or unprocessed, must not be used for the production of coconuts.

4.5.3 Water

The risk of chemical or biological contamination of produce from the water used for irrigation, fertigation, application of chemicals, washing, treatments, cleaning, sanitation, and other forms of handling the produce should be assessed. Moreover, the proximity of water sources on possible sources of contamination (e.g. dumping site, septic tanks, composting area) should be considered to ensure suitability.

Water used from sources that may cause environmental harm to the land and soil, waterways, and sensitive areas should be managed or treated to minimize the risk of health and environmental harm.

Untreated sewage water should not be used for irrigation or fertigation. Whenever treated sewage water is used, water quality should comply with the WHO 1989 published Guidelines for the Safe Use of Wastewater and Excreta in Agriculture and Aquaculture, or the country's guidelines on the matter which is the Department of Environment and Natural Resources (DENR) Clean Water Act, specifically on use of waste water. Otherwise, untreated sewage water should not be used during production and postharvest handling of coconut.

4.5.4 Management of coconut palms

4.5.4.1 Soil tillage

Soil tillage has a beneficial effect on coconut yields, provided it is neither too deep nor too frequent. Shallow tillage (up to 20 cm deep, 2 m radius away from the base of the coconut palm) stimulates the production of new roots and incorporates organic matter into the soil. The best time to till the soil is near the end of the dry season. The soil may also be plowed before the onset of the dry season to break the soil capillaries that promote moisture loss during dry months.

4.5.4.2 Crop nutrition and fertilizer application

Judicious application of fertilizers should be practiced.

The nutrient requirement at different stages of growth is shown in Annex A and C. In addition to macronutrients such as nitrogen, phosphorus, and potassium, coconut needs high quantities of chloride and sulphur. Thus, the use of fertilizer materials containing these nutrients at different stages of growth is highly recommended.

In the absence of leaf and soil analyses of a farm, the recommended rates in Annex C (Table C.1 – C.7) may be used. However, if the farm is intended for organic certification, only allowed organic soil amendments shall be used. For farms with intercrops, potassium chloride (KCl) is highly recommended for use instead of sodium chloride

(NaCl) as sodium (Na) may not be suitable for other crops. Organic fertilizers should also be applied in accordance with Section 4.5.2.2.

4.5.4.3 Integrated Pest Management (IPM) in coconut

Integrated Pest Management in coconut involves the use of a combination of different pest management strategies for the control of various insect pests, pathogens, weeds, and rodents. This consists of cultural, biological, physical, mechanical, and chemical approaches in order to formulate a practical, sustainable, environment-friendly and socio-economically acceptable control strategies.

Cultural methods should be the primary mean of pest management and use of chemicals should be on a need basis. IPM strategies are found in Annex F.

4.5.4.3.1 Choice of crop protection products

Crop protection measures should be appropriate for the control of pests and based on the approval of the competent authority.

Farmers should use agricultural chemicals that are registered for the cultivation of coconut and procured from licensed suppliers and approved by the appropriate government agency. The use of such agricultural chemicals must be in accordance with the approved label instructions for the intended purpose/s.

4.5.4.3.2 Application of crop protection products

Farmers who apply agricultural chemicals should be trained on proper application.

Farmers should use appropriate personal protective equipment (PPE) during applications.

The IPM principles and techniques should be used whenever possible to minimize the use of pesticides. A rotation strategy for chemical application and other crop protection measures should be employed to avoid the development of pest resistance, i.e. use different chemical structural groups (e.g. organophosphates, synthetic pyrethroids, carbamates) of pesticides.

Farmers/applicators should observe established pre-harvest intervals (PHIs) or the period between chemical application and harvest. Ground or aerial application of chemicals should be managed appropriately to minimize the risk of spray drift to neighboring properties and environmentally sensitive areas. For public safety, areas applied with pesticides should be marked with appropriate warning signs until the established re-entry period.

Equipment used for chemical application should be maintained in good working condition and checked before each use. Agricultural chemical sprayers should be calibrated as necessary to maintain the precision of the application rate. Mixing containers, sprayers, and other equipment and tools used for chemical applications

should be thoroughly washed after use, especially when used with different agricultural chemicals on different crops, i.e. to avoid contamination of the produce or damaging the crop. Washings should be contained for proper disposal.

4.5.4.4 Replanting of unproductive coconut palms

Unproductive palms that show declining yield of less than 18 nuts per palm per year should be replaced with the recommended high yielding varieties. This could be done through underplanting or spot planting. Cutting of unproductive palms should be done when the underplanted palms are already at the productive stage.

4.6 Farm diversification

4.6.1 Intercropping

Plant crops between the coconut palms in order to utilize the spaces in between. Generally, the crops would depend on the planting distance of the coconuts. Farms with coconuts that are planted at 10 x 10 meters are good for fruits and other permanent crops like coffee or cacao. Intercrops should be shade loving or shade tolerant. In farms using hedgerow planting system, there is sufficient space for planting annual crops because enough sunlight can reach the ground. Vegetables and cereals require big amount of sunlight. Crops to be used as intercrops should be selected based on site suitability, availability of market, and other value-adding activities. Recommended intercrops for coconut are found in Annex G.

4.6.2 Livestock integration

Livestock integration is another option to maximize land use and farm productivity. Livestock also provides manure that can be processed into organic fertilizer and helps control the weeds in the farm.

4.7 Harvesting and postharvest handling

Coconuts are productive throughout the year, although yields may vary with season. Normal bearing palm produces at least one matured harvestable bunch every 23-30 days depending on the variety. Twelve (12) productive bunches per palm can be harvested annually from tall varieties. On the other hand, dwarfs and hybrids produce 14-17 bunches.

4.7.1 Harvesting

Appropriate harvesting technique should be employed in harvesting to optimize the quality and other desired characteristics of produce during harvest or postharvest phases.

Visual inspection for insect pests and diseases should be done.

4.7.1.1 Sap

It is recommended to select bearing palms with healthy unopened inflorescence. Proper bending of unopened inflorescence should be done to prevent breakage and maximize sap yield. Tapping should be done by using sharp scythe. Interval of collection of coconut sap is generally two to four times a day depending on the intended use. The tip of the inflorescence should be covered appropriately to prevent exposure to sun, wind, and insects.

Harvesting tools and collecting vessels should be used solely for the purpose. These should be made from non-toxic materials, cleaned and disinfected regularly, and stored away from potential contaminants.

4.7.1.2 Fruit

Appropriate maturity indices should be the bases in determining the harvest time. A coconut fruit should be harvested in different ages depending on the purpose and the age is reckoned from flower opening: nine (9) months for fresh young coconut or "buko" processing; 10 months for "bukayo" processing; 10-11 months for makapuno; and 11-12 months for oil and desiccated coconut processing and for seed purposes. For practical and economic reasons, the harvest intervals should be 45-60 days for copra production and every 30 days for virgin coconut oil and desiccated coconut processing.

Fresh young coconut or buko should be harvested by bringing down bunches with the aid of rope to prevent breakage. It should be stored under shade.

Dehusked nuts should be stored away from direct sunlight and not in direct contact with the soil, and properly secured from stray animals.

4.7.2 Transport

Visual inspection of the coconut for insect pests and diseases should be done before transporting.

4.7.2.1 Sap

Conveyances for transporting the harvested coconut sap should be made of such material and construction that will permit easy and thorough cleaning. Facilities should be clean and maintained clean and when necessary disinfected so as not to constitute a source of contamination to the coconut sap. All handling procedures should prevent the coconut sap from being contaminated. Care should be taken to prevent fermentation and to protect against contamination.

4.7.2.2 Fruit

Vehicles should be checked before use for cleanliness, chemical spills, foreign objects, and pest infestation. Coconut should be transported separately from goods that are

potential sources of chemical contamination and causes of biological and physical hazards.

4.7.3 Storage facilities

Agricultural inputs, farm implements, and harvesting tools should have separate storage areas. The storage areas should be well-ventilated and designed for ease of cleaning spills and leaks. It should be free from waste and does not provide a breeding place for pests.

Storage of agrochemicals located in an area far or separate from the living quarters of the farmers, sources of water, and where the coconut is handled. If this is not possible, the fertilizer and the pesticides shall be physically separated and labelled accordingly.

4.8 Environmental safety

To prevent possible ecological imbalance, farmers should use biological controls that are authorized for the cultivation of coconut and should be used in accordance with the approved instructions for the intended purpose/s.

Farm activities comply with country regulations covering protected plant and animal species to ensure that protected species are not damaged.

To conserve native plant and animal species, access and activity is managed in significant remnant native vegetation areas, wildlife corridors, and vegetation areas on and near the banks of waterways.

Measures are used to control feral animals and environmental pests.

The generation of offensive odor, smoke, dust, and noise is managed to minimize the impact on neighboring properties.

4.9 Worker's health, safety, and welfare

4.9.1 Labor conditions

Farmers must be treated in accordance to rules and regulations set by the Department of Labor and Employment (DOLE) for the agricultural sector. All farmers should comply with the country's regulation of the minimum working age which is 18 years of age and above. All farmers must be promptly and rightfully paid for work done. There should be no discrimination in hiring of farmers.

There should be no cases of forced labor, unlawful termination, and prohibition on membership or representation by labor union. Where provided by an employer, living quarters should be suitable for human habitation and contain basic services and facilities.

4.9.2 Safety

Wearing of appropriate PPE and safe handling of inputs and farm implements should be practiced. First aid kits should be readily available to treat farmers of minor cuts and bruises and those that have been accidentally contaminated with chemicals prior to medical attention/treatment in a hospital.

4.9.3 Training

Farmers should be trained on the proper handling of crop protection products and other inputs.

Employers and farmers must have appropriate knowledge or must have proper training on their areas of responsibility that are relevant to good agricultural practice.

4.10 Waste management

Processing and utilization of agricultural wastes and debris is highly recommended. Adequate areas for collection of agricultural wastes should be provided. Non-biodegradable wastes such as plastics, metal containers, bottles, sacks of fertilizers, and others should be segregated from biodegradable waste materials.

Proper disposal of empty pesticide and fertilizer containers and expired chemicals should be followed in accordance to the rules and regulations set by the appropriate government agency.

4.11 Documentation and records

Documentation and records should be prepared and maintained to facilitate recalls and product safety investigations. Information to be recorded relevant to GAP certification are found in Annex H.

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585 ml
586

587 **Annex A**

588 **(informative)**

589 **Optimum conditions for coconut production**

Factors	Description	
1. Rainfall	Total of 1,500-2,500 mm/year, almost uniformly distributed, with at least 125 mm per month. Not more than 3 successive dry months (rainfall less than 50 mm).	
2. Relative humidity	Within 80-90%. A persistently very high humidity favors the speed of fatal fungus diseases, common in very high elevations.	
3. Temperature	Annual mean optimum of 27°C and monthly mean of 20°C, with diurnal variation of 5-7°C.	
4. Soil		
4.1 Moisture	Field capacity moisture (within temperature range 25-40°C of available moisture of 12-15%. Water-logged conditions lasting for more than 1 week is growth-limiting and yield-reducing.	
4.2 Drainage	Well-drained and aerated at all times. Root respiration impaired and plant physiology abnormal under poor drainage conditions.	
4.3 Acidity	Soil acidity of pH 5.5-6.5	
4.4 Depth	> 75 cm (top plus sub-soil)	
4.5 Texture	Either sandy, loamy and clayey grades	
4.6 Fertility	Soil analysis:	
	Organic matter	> 2%
	Total N	1,000 – 2,000 mg/kg
	CEC	> 15 meq/100 g soil
	Exch. K	> 0.5 meq
	Exch. Ca	> 15 meq
	Exch. Mg	> 7 meq
	Exch. Na	> 0.2 meq/100 g soil
	Available P	> 15 mg/kg
	Available S	> 20 mg/kg
	Soluble Cl	> 20 mg/kg
	Available micronutrients	B: > 2 mg/kg
		Zn: > 4 mg/kg
		Cu: > 4 mg/kg
		Fe: > 50 mg/kg
		Mn: > 100 ppm
5. Sunlight	Above 2,000 sunshine hours/year with daily full sunlight (above 4,500 ft-candle light intensity). Provides full and stable bunchs of the palm crown, year round.	
6. Topography	Flat to slightly sloping, rolling to moderately sloping (below 20%)	
7. Wind speed	Strong typhoon-free. Minimal frequency of typhoon for stable nut yields.	

590 **Annex B**

591 **(informative)**

592 **PCA-recommended and NSIC-registered coconut varieties and PCA-recommended**
593 **coconut hybrids**

594 **Table B.1 - PCA-recommended and NSIC-registered coconut varieties**

Tall	Dwarf
NSIC 1996 Co 08 Baybay Tall	NSIC 1996 Co 12 Catigan Green Dwarf
NSIC 1996 Co 09 PYT or Tahiti Tall	NSIC 1996 Co 14 Malayan Red Dwarf
NSIC 1996 Co 10 Laguna Tall	NSIC 1996 Co 15 Aromatic Green Dwarf
NSIC 1996 Co 11 Tagnanan Tall	NSIC 2000 Co 18 Tacunan Green Dwarf
NSIC 1996 Co 13 Bago-Oshiro Tall	Galas Green Dwarf
NSIC 2000 Co 16 West African Tall (WAT)	Kinabalan Green Dwarf
NSIC 2000 Co 17 Rennel Island Tall (RIT)	Magtuod Green Dwarf
Makapuno Tall	VMAC
San Ramon Tall	
Orgullo Tall SV San Ramon	
JAVA Tall	

595 **Table B.2 - Potential yield and basic traits of 10 PCA recommended coconut hybrids and cultivars**

Potential yield and basic traits	CATxLAG (PCA 15-1)	MRDxTAG (PCA 15-2)	MRDxBAY (PCA 15-3)	CATxTAG (PCA 15-4)	CATxBAO (PCA 15-5)	CATxPYT (PCA 15-6)	MRDxPYT (PCA 15-7)	TACxBAO (PCA 15-8)	TACxTAG (PCA 15-9)	BAY (AG2) (Local Tall)
First flowering (yrs)	3-4.0	3-4.0	3-4.0	3-3.5	3-3.5	3-3.5	3-3.5	3-3.5	3-3.5	3-4.5
First nut harvest (yrs)	4	4	5	4	4	4	4	4	4	6
Nut size	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium to large	Medium to large	Medium to large
Nut color	Brown/ green	Brown	Brown	Brown/ green	Brown/ green	Brown/ green	brown	Brown/ green	Brown/ green	Brown/ green
Nuts per palm (n)	117	155	144	119	124	125	127	127	128	114
Nuts per hectare/ year (n)	15,849	20,972	21,968	16,090	16,673	16,857	17,089	17,202	17,295	15,419
Copra per nut (g)	254	272	271	277	283	254	254	310	303	322
Copra per palm (kg)	30	42	39	33	35	32	32	39	39	37
Copra per hectare/ year (t)	4	6	6	5	5	4	4	5	5	5
Weight of whole nut (g)	1,325	1,254	1,193	1,429	1,438	1,131	1,085	1,423	1,404	1,549
Weight of husk (g)	374	298	307	377	372	328	289	312	320	388
Weight of shell (g)	206	202	180	225	214	179	173	239	235	250
Weight of meat (g)	437	456	447	473	473	410	416	507	502	529
Fruit quality value	0.43	0.48	0.48	0.40	0.50	0.50	0.50	0.48	0.48	0.45
MCFA (C6:0-C12:0), %	68.38	72.19	63.17	73.13	68.24	67.00	67.92	73.31	70.33	62.39
Lauric (C12:0), %	52.20	54.51	52.04	53.66	53.68	51.92	53.04	52.57	52.30	47.24
Oleic (C18:1), %	4.03	3.37	5.43	3.36	4.42	3.74	3.31	2.76	2.89	5.97
Linoleic (C18:2), %	0.39	0.32	0.72	0.37	0.63	0.31	0.37	0.37	0.35	1.31
BCR*	1.75	1.76	1.83	1.56	1.47	1.50	1.43	1.88	1.78	1.72
IRR (%)	31	32	32	27	25	27	25	33	31	29

596 * under new planting scheme (with copra and shell as products)

Annex C

(informative)

Recommended fertilization rates

C.1 Nursery

Table C.1 - Fertilization rates (21-0-0 + 0-0-60) of seedlings

Age (months)	21-0-0		0-0-60	
	g/seedling	kg/100 seedling	g/seedling	kg/100 seedling
2	20	2.0	25	2.5
5	40	4.0	45	4.5
Total Nursery	60	6.0	70	7.0

C.2 Nursery

Table C.2 - Fertilization rates (21-0-0 + NaCl) of seedlings

Age (months)	21-0-0		Common salt	
	g/seedling	kg/100 seedling	g/seedling	kg/100 seedling
2	20	2.0	20	2.0
5	40	4.0	40	4.0
Total Nursery	60	6.0	60	6.0

C.3 Coastal areas (palms planted within 2 km from coastline)

Table C.3 - Using $(NH_4)_2SO_4$ + KCl (21-0-0 + 0-0-60)

Palm age	21-0-0		0-0-60	
	Per palm	Per 100 palms	Per palm	Per 100 palms
Field planting	150 g	15 kg	100 g	10 kg
6 months	200 g	20 kg	150 g	15 kg
1 year	500 g	50 kg	500 g	50 kg
2 years	750 g	75 kg	750 g	75 kg
3 years	1.00 kg	100 kg	1.00 kg	100 kg
4 years	1.25 kg	125 kg	1.25 kg	125 kg
5 years or more	1.50 kg	150 kg	1.50 kg	150 kg

Table C.4 - Using $(NH_4)_2SO_4$ + NaCl (21-0-0 + common salt) for soils with adequate K

Palm age	21-0-0		Common salt	
	Per palm	Per 100 palms	Per palm	Per 100 palms
Field planting	150 g	15 kg	80 g	8 kg
6 months	200 g	20 kg	120 g	12 kg

1 year	500 g	50 kg	400 g	40 kg
2 years	750 g	75 kg	600 g	60 kg
3 years	1.00 kg	100 kg	800 kg	80 kg
4 years	1.25 kg	125 kg	1.00 kg	100 kg
5 years or more	1.50 kg	150 kg	1.20 kg	120 kg

C.4 For inland areas (palms planted more than 2 km from coastline)

Table C.5 - Using $(NH_4)_2SO_4$ + KCl (21-0-0 + 0-0-60)

Palm age	21-0-0		0-0-60	
	Per palm	Per 100 palms	Per palm	Per 100 palms
Field planting	150 g	15 kg	200 g	20 kg
6 months	200 g	20 kg	250 g	25 kg
1 year	500 g	50 kg	600 g	60 kg
2 years	750 g	75 kg	900 g	90 kg
3 years	1.00 kg	100 kg	1.50 kg	150 kg
4 years	1.25 kg	125 kg	1.70 kg	170 kg
5 years or more	1.50 kg	150 kg	2.00 kg	200 kg

Table C.6 - Using $(NH_4)_2SO_4$ + NaCl (21-0-0 + common salt) for soils with adequate K

Palm age	21-0-0		Common salt	
	Per palm	Per 100 palms	Per palm	Per 100 palms
Field planting	150 g	15 kg	160 g	16 kg
6 months	200 g	20 kg	200 g	20 kg
1 year	500 g	50 kg	480 g	48 kg
2 years	750 g	75 kg	720 g	72 kg
3 years	1.00 kg	100 kg	1.25 kg	125 kg
4 years	1.25 kg	125 kg	1.35 kg	135 kg
5 years or more	1.50 kg	150 kg	1.70 kg	170 kg

Table C.7 - Fertilizer nutrient recommendations for coconut (a guide)

Age	Nutrient rate per palm						
	N	P_2O_5	K_2O	MgO	S	Cl	Borax
Field planting	30 g	30 g	90 g	50 g	18 g	66 g	0
6 months	40 g	50 g	0.15 kg	85 g	25 g	0.11 kg	7.5 g
1 year	0.10 kg	0.10 kg	0.35 kg	125 g	60 g	0.26 kg	15 g
2 years	0.15 kg	0.15 kg	0.55 kg	0.25 kg	90 g	0.40 kg	15 g
3 years	0.20 kg	0.16 kg	0.77 kg	0.35 kg	0.12 kg	0.53 kg	15 g
4 years	0.30 kg	0.20 kg	1.00 kg	0.40 kg	0.18 kg	0.70 kg	15 g
5 years or older	0.40 kg	0.30 kg	1.20 kg	0.50 kg	0.24 kg	0.90 kg	15 g

Annex D

(informative)

Recommended planting systems and distance

Table D.1 – Square and triangular systems and their planting densities

Method	Population density (palms/unit area)				
	1 ha	2 ha	3 ha	4 ha	5 ha
Square					
8 m x 8 m	156	312	468	625	781
8.5 m x 8.5 m	138	277	415	553	692
9 m x 9 m	134	247	370	494	617
10 m x 10 m	100	200	300	400	500
Triangular					
8 m x 8 m	180	361	542	727	903
8.5 m x 8.5 m	160	319	479	639	799
9 m x 9 m	143	284	427	570	712
10 m x 10 m	115	230	346	462	577

Table D.2 – Rectangular system planting density

Distance between rows	Planting density (palms/ha)
8.5 m	117
9.0 m	111
9.5 m	105
NOTE 1 not recommended for monoculture	

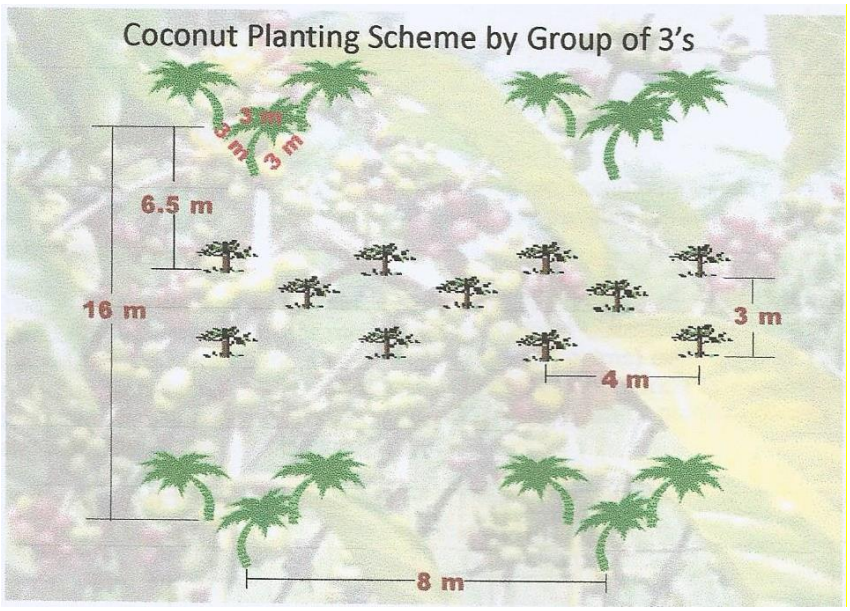


Figure D.1 – G3pH planting system

Annex E

(normative)

Banned and restricted pesticides in the Philippines

E.1 Banned pesticides in the Philippines

1. 2, 4, 5-T
2. Aldrin
3. Azinphos Ethyl
4. Chlordane
5. Chlorodimeform
6. Copper Aceto-Arsenic (Paris Green)
7. DBCP
8. DDT
9. Dieldrin
10. EDB
11. Elemental Phosphorus (White & Yello)
12. Endrin
13. EPN
14. Gophacide
15. HCH.BHC
16. Heptachior
17. Leptophos
18. Mercuric Fungicides
19. Parathion-Methyl
20. Parathion-Ethyl
21. 1-Naphthylthiourea (ANTU)
22. Nitrofen
23. Organotin
24. Sodium Fluoroacetate
25. Sodium Fluoroacetate (1801)
26. Strychnine
27. Thalium Sulfate
28. Toxapehene

E.2 Restricted pesticides in the Philippines

DDT	All users cancelled except for malaria control purposes by the Department of Health.
Paraquat	Restricted for Institutional Use only. Approval of use will be based on strict compliance by the imported / end-user of the requirements act for its use.
Phenamiphos Entropop Methidation	For use in Banana Plantations Only.
Inorganic Arsenicals (Arsenic Trioxide)	For use by FPA Accredited wood treatment and wood preserving plants only.
Lindane (Gamma / BHC)	The only allowed use to date is on pineapple plantations by soil pre-plant application.
Penthachlorophenol	For use in wood treatment only by FPA Accredited wood treatment plants and institutions.
Endosulfan	Not for use in paddy rice culture. Concentration be lowered to 5% EC or lower for other uses.
Monocrotophos	Allowed use is for beanfly control only.
Methyl Bromide Carbon Disulfide Phosphine Generating Compoounds	Adequate time for acration is required after treatment before commoxlities are processed into food or feed.

HCN Generating Materials Carbon Tetrachloride Chloroform Ethylformate	
Aldicarb	Importation Not Allowed Except in Cases of Emergency as determined by the Authority

668
669 **E.3 Status of POPs in the Philippines**
670
671 **Pesticides**

Aldrin	Banned
Chlordane	Banned
DDT	Restricted All Uses cancelled except for malarial control purpose of the Department of Health
Dieldrin	Banned
Endrin	Banned
Heptachlor	Banned (Never Registered)
Hexachlorobenzene	Banned (Never Registered)
Mirex	Banned (Never Registered)
Toxaphene	Banned (Never Registered)

672
673 **Chemicals**

Dioxins	Not Regulated by the Authority
Furans	Not Regulated by the Authority
Polychlorinated Biphenyls (PCBs)	Not Regulated by the Authority
Hexabromobiphenyls	Not Regulated by the Authority
Polyromatic Hydrocarbons (PAHs)	Not Regulated by the Authority

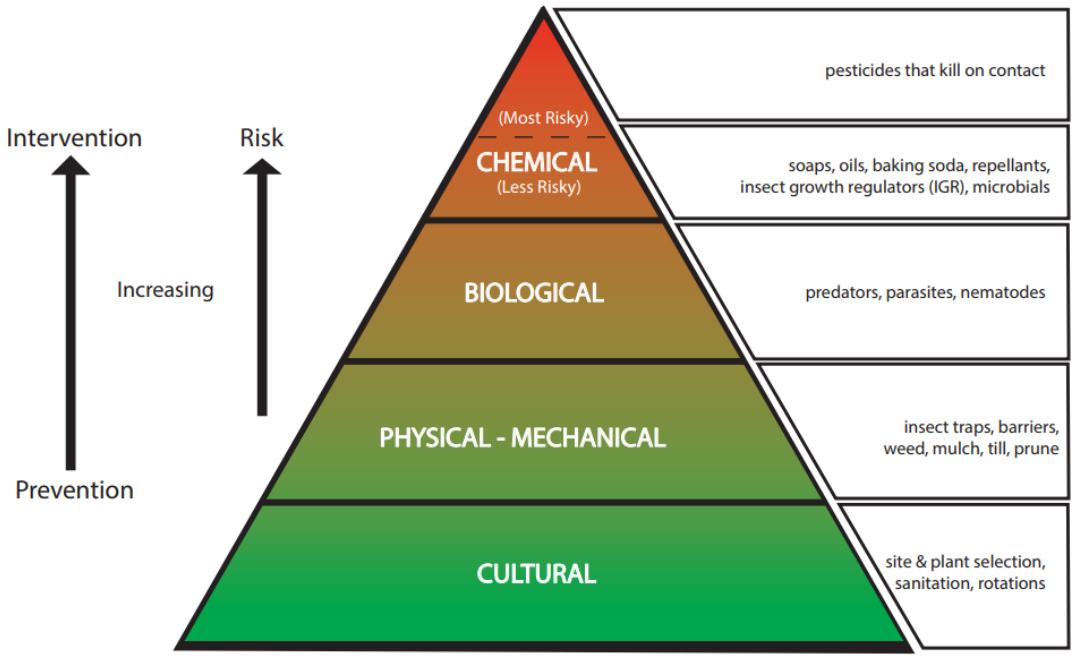
674

675 **Annex F**

676 **(informative)**

677 **Integrated Pest Management strategies**

678



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680 **Figure F.1 – Pyramid of IPM tactics**

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682 **F.1 Integrated insect pest management of coconut**

1. Coconut leaf beetle	
Scientific name	*Brontispa longissima*
Synonyms	Coconut Leaf Hispine, Palm Leaf Beetle
Common name	Coconut Leaf Beetle
Family	Chrysomelidae
Order	Coleoptera
Damage characteristics	1. Yellowing of the coconut leaves 2. Wilting of developing buds 3. Curling of the leaflets
Host ranges	Coconut, Royal Palm, Chinese Fan Palm, Areca Nut Palm
Management/control • **Mechanical control**	Blockading and cutting of coconut palms up to three kilometers from the infestation spot are done to prevent the beetle from spreading.

• **Biological control**	Two parasitoid of coconut leaf beetle Tetrastichus brontispae and Asecodes hispinarum have been successfully used in the control of beetle.
2. Asiatic palm weevil	
Scientific name	*Rhynchoporus ferrugineus*
Synonyms	Indian Palm Weevil, Coconut Weevil
Common name	Asiatic Palm Weevil
Family	Scarabaeidae
Order	Coleoptera
Damage characteristics	1. Wilting of leaves 2. Hollowed stems due to internal feeding 3. Presence of holes in the stems
Host ranges	Coconut, Sugar Palm, Sago Palm, African Oil Palm
Management/control • **Cultural control**	Practice proper sanitation; avoid wounding palms; destroy infested palms
3. Coconut scale insect	
Scientific name	*Aspidiotus destructor* or *Aspidiotus rigidus*
Common name	Coconut Scale Insect
Local name	Cocolisap
Family	Coccoidae
Order	Hemiptera
Damage characteristics	1. Scales with yellow spots 2. Entire leaves turning yellow to brown and fall 3. The leaves tend to dry-out in extreme cases
Host ranges	Coconut; Breadfruit, mango, cocao, papaya, cotton, oil palm, rubber, sugarcane, and tea
Management/control • **Cultural control**	Coconut scale insect can be eradicated from new areas by destroying infested plants and plant parts.
• **Biological control**	The most common predators of the coconut scale insect include Coccinelid beetle, *Chilocorus* spp, *Cryptognatha nodiceps*, *Pseudocymnus anomalus*, and *Telsimia nelida.* parasitoid of CSI.
4. Slug caterpillars	
Scientific name	*Delia platura; Thosea* spp, *Microthosea* spp., *Setora* spp., *Darna* spp.
Common name	Slug Caterpillars
Family	Limacodidae
Order	Lepidoptera
Damage characteristics	Larvae feed at night on mature, firm leaves, initially scarifying surface and later making holes; can defoliate plants at high population densities (outbreaks)
Host ranges	Corn, Broccoli; Cauliflower; Radish; fruit trees; coconut
Management/control	

Cultural control	Make row covers, speed-up germination, avoid green manure
Biological control	Predacious soil beetles, a predatory pentatomid, *Eocanthecona furcellata* (Wolff) and Reduviid bug, *Sycanus* sp.
Chemical control	Chlorpyrifos, Bifenthrin

683

684 **F.2 Integrated disease management of coconut**

Technology	Brief description
1. Bud and fruit rots (*phytophtora palmivora* Butl.)	
a) Colored coconut varieties are more susceptible to bud and fruit rots	• The apparent susceptibility of colored coconut populations (reference to the immature nuts), the yellow (MYD) and red (MRD) as parent materials of coconut hybrids. A nationwide survey showed that MAWA (Malayan Yellow Dwarf x West African tall) hybrid found highly susceptible to the disease while the local green dwarfs and tall varieties showed high levels of tolerance to the disease. Moreover, artificial inoculation (in-vitro) in the laboratory showed that colored (yellow, red or brown) populations are generally highly susceptible to *Phytophthora* infections than the green populations.
b) Fungal species as biocontrol agents against *Phytophthora* under laboratory condition	• *In-vitro* bioassay tests showed that *Trichoderma* sp. and *Chaetomium* sp. were found as potential biocontrol organisms/agents against the disease.
c) Farm sanitation as preventive control of the *Phytophthora*	• Farm sanitation, cutting and burning of infected palms/nuts and other alternate infected hosts (e.g. affected with durian stem canker and cacao pod rot) to prevent further spread of the disease.
d) Chemical application to control *Phytophthora* in young plantings	• Application of cupric hydroxide at 25/g/l/palm every 6 mo. significantly lowered disease incidence. Treatment application is done through canopy spray and solution directed to axils of leaves and fruits.
2. Leaf spot [*Pestalozzia palmarum* (Cooke) Steyart and *Helminthosporium* sp.]	
a) Resistant coconut variety to fungus leaf spots	• Catigan Dwarf coconut variety has high tolerance to leaf spot disease in the nursery. Other varieties such as Tacunan dwarf, Yellow dwarf and Red/Orange dwarf population are more susceptible to fungus leaf spot infection.
b) Clean culture to prevent leaf spot incidence in the nursery	• Practice of cultural management through clean culture, removal of pruning of infected leaves prevents leaf spot occurrence in the nursery.

Technology	Brief description
c) Potassium chloride (KCl) fertilizer included resistance of palms to leaf spot	• Application of potassium chloride (KCl) fertilizer on mature coconut farms induced resistance to coconut leaf spots. Common salt (NaCl), a cheaper and effective source of Cl nutrient and a.i., has been recommended, especially in coconuts grown in K-rich soils.
3. Socorro wilt	
Integrated disease management strategies against the Socorro wilt	• Cutting and burning of infected palms at the earliest sign of infection minimize the spread of the disease as it had been observed to spread up to 12 km radius from coconut farm where it was first identified to occur (Socorro, Oriental Mindoro). Strict quarantine regulations by restricting outward movement of coconut products and by products from areas of disease occurrence contained the disease.
4. Stem bleeding [*Thielaviopsis paradoxa* (de Seynes) Von Hohnel]	
Integrated control of stem bleeding	• Scrap out tissues affected with stem bleeding and apply fungicide paste and chemical repellent to prevent secondary infestation by other pest. Use of Cl-based fertilizers reduce it. • Avoid unnecessarily wounds on trunk • Alliete and Benlate were found to inhibit growth of *T. paradoxa in vitro.*
5. Cadang-cadang	
a) Control directions of the disease spread	• A feasible step in managing viroid diseases in planting certified disease-free-materials and removing sources of inoculum in the field. The advent of modern molecular technologies proved that recognition of the disease at the earliest possible stage by reliable means is the key factor in the success of the above strategy. Very low yield (productivity) per tree or per hectare can be very when multiplied over the vast coconut areas and the oil palm plantations that could be possibly afflicted by the disease coming from a symptomless or latent source.

685

686 **F.3 Integrated weed management of coconut**

Technology	Brief description
1. Cogon [*Imperata cylindrica* (L.) Beau] a) Replacement of cogon vegetation under coconut with leguminous covercrop	• Establishment of leguminous covercrops after glyphosate application is a practical and effective way of suppressing the cogon weed infesting coconut plantation Advantages from covercropping are: 1) elimination of tough crop-weed competition;

	and 2) substantial reduction in weeding operations, hence less expensive and crop yield improvement in the long run. Improvement of soil fertility and erosion control are also benefits derived from the practice
b) Adaptability of winged bean (*Psophocarpus tetragonolobus* L.) as profitable covercrop under coconul	• Demonstrated the adaptability of winged bean as a profitable weed suppressant complementing as a covercrop in coconut farms. lt can improve soil fertility in addition to producing edible pods and seeds as a protein source.
2. Purple Nutsedge (*Cyperus rotundus* L.) a) An effective herbicide combination Io control *Cyperus rotundus* L. in coconut nursery establishment	• Control of *Cyperus rotundus* L. in coconut nursery by using glyphosate followed by paraquat. This method was found to be more practical and economical than manual weeding alone especially in large scale polybag coconut nurseries. Use of these herbicides ensured faster weed control, thereby allowing time for labor-intensive nursery activities"
3. Hagonoy [*Chromolaena odorata* (L.) R.M. King & M. Robinson] a) Voracious foliage feeder, *Pareuchaetes pseudoinsulata* on 'Hagonoy'	• An arctiid moth, *Pareuchaetes pseudoinsulata*, as a biological control agent is a voracious foliage feeder. Total detoliation was attained after continuous exposure to the arctiid larvae.
b) A gall fly *Procecidochares connexa*, as biocon agent of 'Hagonoy'	• Successful[y developed mass rearing of the imported gall fly, a spePcilic galling fly against *C. odororata*. A total dieback of the *C. odorata* was attained in 6 mos. due to gall pressure. The fly had been observed to be definitely host specific to *C. odorata*.

687

Annex G

(informative)

Recommended intercrops for coconut

Vegetables/Legumes

- Pole Sitao (sitaw)
- Cabbage (repolyo)
- Mungbean (mungo)
- Okra (okra)
- Burst Sitao (sitaw baba)
- Cowpea (paayap)
- Onion (sibuyas)
- Peanut (mani)
- Musk Melon (melon)
- Tomato (kamatis)
- Squash (kalabasa)
- Eggplant (talong)
- Bitter gourd (ampalaya.amargoso)

Spice Crops

- Hot Chili (sili-labuyo)
- Sweet Pepper (sili)
- Black Pepper (palay tigang)

Cereals

- Corn (mais)
- Upland Rice (palay tigang)

Root Crops

- Sweet Potato (kamote)
- Gabi (gabi)
- Cassava (kamoteng kahoy)
- Ubi (ubi)
- Arrowroot (arorot)
- Ginger (luya)

Fruitcrop/Fruit Trees

- Banana (saging saba)
- Durian (duriyan)
- Lanzones (lansones)
- Pineapple (pinya)
- Rambutan (rambutan)
- Citrus (Mandarin, Pomelo, Calamansi)

Beverage Crops

- Coffee
- Cacao

738 **Annex H**

739 **(normative)**

740 **Information to be recorded relevant to GAP certification**

Section	Records
Site selection and management	New sites - cropping history - potential hazards during assessment and remedial action, if any
	Existing sites - cropping history
	Multiple production areas - name or code of each production area
Planting material (for new sites and replanting)	From accredited nurseries - name and specifics of cultivar - name of supplier - date of procurement
	From with-in farm or non-accredited sources - chemical used for treatment, if applicable - purpose of the treatment - varietal classification (tall, dwarf, hybrid)
Fertilizer and soil additives	Type of fertilizer used (organic or inorganic)
	Name of fertilizer
	Source - brand name - supplier - lot number
	Date
	Quantity
	Expiration date (for liquid fertilizer)
	Fertilizer grade
	Application - date - location of area fertilized - number of fertilized farms - application rate (per palm) - application method - name of applicator
Water quality	Water source
	Test results or certification from LGU
	Corrective actions, if there is a presence of contamination
	Treatment method used and monitoring results, if water treatment is done

	Irrigation use, if applicable - schedule and frequency of irrigation - location in the farm that is irrigated - volume of water applied/duration of irrigation - name of personnel who managed the irrigation activity
Crop protection	Type of pesticide used (biopesticide, chemical pesticide – synthetic or organic)
	Target organism
	Source - name of pesticide o common name o brand name - lot number
	Date of purchase
	Quantity purchased
	Expiration date
	Active ingredient
	Pre-Harvest Interval
	Application - date and frequency of application - location of area applied - number of treated palms - application rate (per palm) - application method - name of applicator
	For biocontrol agents - date of frequency of release - name of biocontrol agent - target organism - brand of biocontrol agent - quantity released - area treated
	For stored chemicals - chemical name - date and quantity obtained - expiry date and date when completely used or disposed of
	Maintenance and calibration activities for agricultural chemical sprayers
Harvest	Date of harvest
	Volume of harvest
Worker's health, safety, and welfare	Proof of training
	Medical certificate
	Record of salary and wages received by farmers
Waste management	Types of waste products generated

	practices to minimize waste generation Procedures for reuse and recycling of waste storage and disposal of waste

741

Annex I

(informative)

Guide to selection and safe handling of crop protection products

Mixing of crop protection products

The mixing area should be located and chosen in such a way that the risk of contaminating the farmers and the environment are minimized.

Mixing of agricultural chemicals should be carried out in a manner that will prevent ground and surface water contamination and the land in the surrounding areas.

The filling and mixing areas for the crop protection product should be equipped with appropriate tools for precise measurements and calibrations. The functionality of such should be checked before every cropping season by the farmer/applicator. The filling and mixing areas should have floor brush, dustpan, plastic bags and adsorbent materials such as sand. These materials should be placed in a fixed location within the specific area, to be used in case of spillage of crop protection product.

Emergency facilities in the event of accidental spill during mixing should be readily available.

Prepare only the necessary volume of spray solution to avoid surplus application mix.

Surplus application mixes are disposed of in a manner that does not present a risk of contaminating the produce.