COCOA: NIGERIA CODE OF PRACTICES
PESTICIDE APPLICATIONS IN COCOA VALUE CHAIN

Price Group:
SON

ICS XX: XXX

son

STANDARDS ORGANISATION OF NIGERIA

Lagos Operational Office
13/14 Victoria Arobieke Street,
Off Admirality Way,
Lekki Penisula Scheme 1,
Lekki, Lagos, Nigeria.

Standards Organization of Nigeria
Cooperate Head Office
Plot 1687, Lome Street,
Abuja,Nigeria

FOREWORD

Cocoa (*Theobroma cocao*) grown in West and Central Africa and has always been a source of economic boost to the entire region. Cocoa bean like other economic crops is highly susceptible to pests and thus often need the application of pesticides especially in storage.

The usage of pesticides in cocoa benefits not only farmers but all players in the cocoa value chain including consumers. Proper pesticides use reduces food losses not only during cultivation of cocoa, but also during the post-harvest storage stages, while inappropriate use of pesticides result in loss in poor quality cocoa, creates trade barriers and economic losses . This has therefore the elaboration of this code of practice in accordance with SON act 56 1971 as amended to protect, ensure safe and good quality cocoa is available for desired use. Therefore promoting fair trade practices among stakeholders.

The Technical Committee on Cocoa and Cocoa Products, deliberated on this Code of Practice and in preparing the Code, references were made to relevant International Standards, research institute and industry practices, all of which are hereby acknowledged.

1. SCOPE

This Nigeria Code of Practices provides guidelines and good practices on the application pesticides on cocoa along the value chain. The code include guide on:

- Selection of pesticide.
- Risk associated with storage
- the acceptable pesticides for cocoa in farm and store
- Safe and effective application of pesticide on cocoa.
- Consideration safety.

The code does not include processing, handling and storage of cocoa.

2. NORMATIVE REFRENCE

The following references contain provisions applicable to this Nigerian Code of Practice at the time of publication the editions indicated were valid. These standards and publications are subject to revision and parties to this standard are encouraged to investigate the possibility of applying the recent editions of these references indicated below.

2.1 FAOs Guidelines on Minimum Requirements for Agricultural Pesticide Application Equipment (Volume I).

2.2 Pesticide Registration Regulations 2005 Drugs and Related Products Act 1996 (As Amended) of NAFDAC

2.3 NIS 468:2014 Standard for Cocoa beans

3 TERMINOLOGIES

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

3.1 Acceptable Daily Intake (ADI

An estimate of the amount of a substance (usually an active ingredient A.I) that can be consumed daily, for a lifetime, without harm to the person

3.2 Active Ingredients (A.I)

Ingredients that determine the biological activity of a pesticide this also refers to Composition.

3.3 calibration

The - process of measuring and adjusting the amount of pesticide that a pesticide application equipment will supply to the target area.

3.4 cocoa

Theobroma cocao L and is a member of Sterculiaceae or Sterculia family

3.5 contamination

Cocoa which has smoky, hammy or other off-flavour taste or smell, or which contains a substance not natural to cocoa

3.6 drench application

Pesticide poured around the base of the tree or on the tree trunk.

3.7 formulation;

The state in which pesticides appears.

3.8 GAP

Good Agricultural practices (GAP) are specific methods which when applied to agriculture, create food for consumers or further processing that is safe and whole some.

3.9 Integrated Pest Management (IPM)

An ecosystem approach to cocoa crop production and protection that combines different management strategies and practices to grow healthy cocoa crops and minimize the use of pesticides

3.10 pests

Any organism (plant or animal) detrimental to humans, human concerns or interests (as agriculture or livestock production)

3.11 pesticide

Any substance which is used to control a pest: at any stage in crop production, storage or transport

3.12 pesticide application

The (practical) way in which pesticides (including herbicides, fungicides, insecticides, or nematode control agents) are delivered to their biological targets

3.13 product label

The main source of information that helps in using a pesticide safely and effectively is the product label. This comes with the product container at the time it is supplied.

3.14 Pre-Harvest Interval (**PHI**):

The period (number of days) that must pass between the time of the last application of a pesticide and when the crop is cut for harvest

3.15 residues

Traces of veterinary medicines or pesticides or derivatives thereof which remain in the final product (cocoa).

3.16 sprayer

Equipment with spray nozzles to apply herbicide, insecticide, and, or fertilizer to help in the management of crops or environment.

3.17 stored cocoa

Cocoa fruits that can be stored a few days before opening. Once dried, cocoa beans can be stored for months or years (in bags or in bulk and so on) at normal temperatures and relative humidity.

3.18 spray drift

This is the carrying away of pesticide particles off targeted area while spaying.

3.19 systemic pesticide

A pesticide that is absorbed and circulated through the vascular system of a plant or animal

3.20 threshold levels

The levels of pest populations at which pest management action should be taken to prevent pests from causing unacceptable damage

4. GENERAL PRINCIPLES

Relevant background knowledge is required for the application process of pesticides on cocoa and is essential to cocoa pest management. A series of processes are usually embarked on in the preparation of cocoa for pesticide application and care should be taken in the sequenced processes to ensure the right condition as illustrated in Appendix I:

4.2 Cocoa and Pests

Cocoa, like other tropical crops, is often ravaged by insects, diseases and other pests that must be controlled effectively as well as safely. More also, pests pose a major threat to the safety and suitability of Cocoa.
Good hygiene practices shall thus be employed to avoid creating an conducive environment, Good sanitation, inspection of incoming materials and good monitoring can minimise risks of in Stored Cocoa. None the less, the use of pesticides may be used as protective and, or a control measure on pests**.**

4.3 Pest Problems of Cocoa

In tackling pests of cocoa it is important to understand the various pests of cocoa capable of attacking cocoa at various stages. Table 1 outlines some of the most economically important pests of cocoa.

Table 1. Some Pest of Cocoa in Farm

Cocoa Pest	
Black pod rots	*Phytophthora* spp.
- especially:	*P. megakarya*
Witches' broom disease	*Moniliophthora (Crinipellis) perniciosa*
Frosty pod rot	*Moniliophthora roreri*
Capsids (Miridae)	*Sahlbergella singularis, Distantiella theobromae* *Helopeltis* and related spp. *Monalonion* spp.
Swollen shoot virus (CSSV)	Vectors: mealy-bugs such as *Planococcoides njalensis*
Vertebrates (many spp. depending on region)	Squirrels, rats, larger mammals, woodpeckers, *etc.*
Cocoa pod borer	*Conopomorpha cramerella*
Vascular streak die-back (VSD)	*Ceratobasidium (=Oncobasidium) theobromae*[3]
Other diseases including	Several spp. including:
- root diseases	*Ceratocystis* & *Roselinia* spp
- minor pod diseases	*Botryodiplodia theobromae*
Insect pests of cocoa trunks, including termites, stemborers, *etc*	Various spp. including: *Zeuzera* sp. (S.E. Asia) *Eulophonotus* sp. (Africa)
Pests of young cocoa	Many spp, - often polyphagous
Weeds (especially in young cocoa)	Many spp (includes mistletoe on mature trees)

Some Storage pests likely to infest cocoa beans in storage include:

Warehouse moths (Lepidoptera)

Especially: Cocoa moth (=Warehouse moth) *Ephestia elutella* (Pyralidae)
Tropical warehouse moth (= Almond moth) *E. cautella*
Dried fruit moth *Coryra cephalonica* (Pyralidae)

Beetles (Coleoptera) such as:

Cigarette beetle *Lasioderma serricone* (Anobiidae)
Corn sap beetle *Carpophilus dimidiatus* (Nitidulidae)
Rusty grain beetle *Cryptolestes ferrugineus* (Cucujidae)
Coffee bean weevil (esp. at high humidity) *Araecerus fasciculatus* (Anthribidae)
Rust-red flour beetle *Triboleum castaneum* (Tenebrionidae)
Lesser gain borer *Rhizopertha dominica* (Bostrichidae)

4.3 GENERAL PERSONNEL REQUIREMENTS FOR APPLICATION OF PESTICIDES ON COCOA

A Person who is to handle and, or apply pesticide on cocoa shall meet the following requirements,

4.3.1 Should have received adequate training in using pesticides safely
4.3.2 Should be skilled in the job they are carrying out relating to pesticides.
4.3.3 Should be trained and have knowledge in relevant laws
4.3.4 Should be trained on the risks associated with pesticides (i.e. whether the substance itself can harm people, wildlife or the environment.)
4.3.5 Should be trained on equipments for applying pesticide.

4.3.6 Shall not be pregnant at point of applying pesticide

4.3.7 Should not be a child in accordance to Labour Regulation of the Federal Ministry of Labour and Productivity, Federal Republic of Nigeria

5. PRE-APPLICATION PROCESS OF PESTICIDE

The following pre-application practices shall apply before the spray of pesticide:

5. 1 DECISION ON SELECTION OF APPROPRIATE PESTICIDE(S) FOR COCOA

Care should be taken when deciding whether or not to use a pesticide(s). In considering whether to use a pesticide it shall abide by Pesticide Registration Regulations 2005 Drugs and Related Products Act 1996 (As Amended) of NAFDAC and the pesticides should be those approved by the Cocoa Research Institute of Nigeria (Table 1 shows a list of the pesticides approved at time of this publication). Plan should also be in place to ensure that pests are effectively controlled in a way which protects the health of people, plants or creatures not intended for treatment and the environment at large.

In identification of appropriate pesticide the following is recommended:

5.1.1 Identify the specific pest affecting the area concern.

5.1.2 Consider whether someone would be needed to help (Professionally i.e. Agronomist).

5.1.3 Upon reaching the decision to use a pesticide, plan should be made to use it properly.

5.1.4 Check for ways to reduce the amount used and the area it is to be applied on.

5.2 PESTICIDE SELECTION

Table 2 shows the list of pesticides formulations and active ingredients that have been approved for use in Cocoa cultivation and storage withn the value chain in Nigeraia by the Cocoa Research Institute of Nigeria (CRIN). Users of this standard are encouraged to use these products. Attention is drawn to the fact that certain chemicals are acceptable in certain markets but not others and have not received formal approval; other pesticides that are specifically not permitted – these are listed in Annex iii

Table 2: List of Pesticides Approved For Use on Cocoa in Nigeria

S/n	Trade name	Active ingredient	Distribution company in Nigeria	Target pest
	Insecticide			
1.	Actara 25 WG	Thiamethoxam	SYNGENTA	Mirid
2.	Esiom 150 SL	Acetamiprid + Cypermethrin	INSIS	Mirid
	Fungicide			
1.	Funguran-OH	Copper hydroxide	INSIS	Black pod
2.	Champ DP	Copper hydroxide	SARO	Black pod
3.	Ridomil gold 66WP	Cuprous oxide + metalaxyl-M	SYNGENTA	Black pod
4.	Copper Nordox 75 WP	Cuprous oxide	DIZZENGOFF	Black pod
5.	Ultimax plus	Metalaxyl+ Copper hydroxide	HARVESTFIELD	Black pod.
6.	Kocide 101	Cuprous Oxide	SARO	Black pod.
7.	Kocide 2000	Cuprous hydroxiide	DUPONT	Black pod.
	Herbicides			
1.	Touch down	Glyphosate	SYNGENTA	Weed
3.	Clear weed	Glyphosate	HARVESTFIELD	Weed
2.	Round up	Glyphosate	CANDEL	Weed
	Fumigants			
1.	Phostoxin	Aluminum phosphide	GONGONI	Storage pests

Source: Cocoa Research institute of Nigeria (CRIN), Ibadan, Oyo state, Nigeria, .

The Cocoa Research Institute of Nigeria (CRIN) has the national mandate to evaluate and recommend novel cocoa pesticides in Nigeria and recommends cocoa pesticides application equipments

5.3 PREPARATORY CHECK LIST TO SPRAYING THE SELECTED PESTICIDE

The following check should be carried out before applying the pesticide,

5.3.1 Had suitable training and, if necessary, gained a certificate of competence to apply the pesticide in the proposed way.

Read and implement directives on the product label and any extra information relating to off-label uses.

5.3.1.1 Put in place any measures to control exposure, and keep these measures up to date.

5.3.1.2 Ensure Suitable PPE(Personal Protective Equipment) is available.

5.3.2 Ensure an appropriate environmental risk assessment is done and any measures to protect wildlife and the environment, such as buffer zones or other restrictions on use.

5.3.3 Take measures to meet conditions on the label for keeping livestock or people out of treated areas for a certain period.

5.3.4 Get advice and, when necessary, received permission from the appropriate agencies (such as Agricultural extension agents), before using pesticides in areas of special environmental status in or near water, from aircraft and, where necessary, on public rights of way.

5.3.5 Give adequate notice to occupiers of neighbouring properties and members of the public.

5.3.6 Display warning notices and give adequate notice to beekeepers.

5.3.7 Check equipment for applying pesticide to make sure it is in good working order and is working correctly and accurately.

5.3.8 Put emergency procedures in place and make sure operators have access to the following:

5.3.8.1 Appropriate emergency equipment such as spill kit and decontamination equipment for skin and eyes

5.3.8.2 Emergency details for the products being used

5.3.8.3 A list of emergency contact details for the environment agencies and medical services.

5.3.8.4 Ensure the pesticide can be transported safely and legally to the area to be treated.

5.3.9 Got enough of the correct pesticide to complete the job, and checked the calculations of the amount of pesticide needed for each tank, load or run, possibly allowing for an untreated or under-dosed area for disposing of sprayer washings.

Make appropriate arrangements for cleaning equipment and disposing of any waste pesticide and pesticide packaging (such as containers, closures and foil seals) safely and legally

5.4 PRACTICES IN MIXING OF PESTICIDE SELECTED

5.4.1 Before mixing, the sprayer shall be tested with water to see if it leaks and is working properly.

5.4.2 Read the label to determine the proper mixture.

5.4.3 Wear PPE (Personnel Protective Equipments) as appropriate.

- Farmers shall maintain PPE and ensure they are worn properly.
- Comfortable clothing should be worn that protects much of the body, arms and legs.
- A face visor should be used and is especially important if an irritant or harmful pesticides is used.
- Trousers should be worn on outside of boots
- If a motorized mist blower is used , ear defenders should be used alongside.

6. PRACTICES IN CHOICE OF APPLICATION METHOD OF SELECTED PESTICIDE

The method of application is crucial, but it is often the most neglected aspect of pesticide use. Together with attention to number of sprays, careful application is one of the important ways in which pesticide residues can be controlled, as it determines the dosage delivered to the crop. The application equipment to be used must be one recommended by Cocoa Research Institute of Nigeria (CRIN) in accordance with the Nigerian Research Institutes Decree No. 35 of 1973.

Table 3: List of sprayers tested and approved for use by CRIN on cocoa farms in Nigeria

S/N	Name	Manufacturer/Local company representative
Pneumatic knapsack sprayers		
1	Maruyama MHC8	-
2	CP 100 falcon	-
3	CP 148	-
4	Flora Birchmeier	-
5	Gloria 172 RT	-
6	Four Oaks	-
7	Solo Jet Pak – 425	-
Pneumatic knapsack sprayers		
8	AS-Motor	-
9	Maruyama DMD 140	-
10	MS – Iyanmer	-
11	Solo 423	-
Swing fog machines		
12	SN 11	-
Hand pumps		
13	Lancet	-

S/N Name	Manufacturer/Local company Representative
Hydraulic knapsack sprayers	
1. Pulmic PM 120:	Sanz hnos of Spain/The Candel Company, Nigeria.
2. Jacto PJ – 16:	Maquinas Agricolas Jacto S.A./Dizengoff Company Ltd Nigeria.
3. Rosy 16:	Di Martino, Italy/Saro Agro Science, Nigeria.
4. Solo:	Solo Sprayers Ltd., England/Harvest Field Industries Ltd., Nigeria.
5. Neptune 15:	Kwazar Corporation S.C., Jaktorow, Poland/Lajibam Auto & Agric concerns Ltd., Nigeria.
6. Osatu:	Goizper S. Coop, Spain/Adewale Oladayo Trading Stores Ltd., Nigeria
7. CP 15:	Hardi International A/S of Denmark/Nunees Nig. Ltd.
8. Kizan KJ – 16:	Indo German Agril Sprayer/African Agro Co Ltd., Nigeria.
9. Volpi 78:	Davide Luigi Volpi S.P.A. Italy/Jubaili Agrotec Ltd., Nigeria.
10. Titan heavy duty:	Marolex SP Zo. O Poland/Komes Ventures Ltd., Nigeria.
11. Mob:	MOB Company UK/Harvest Field Industries Ltd., Nigeria.
12. Garden 15:	Di Martino S.P.A Italy & Fem-Fun Nigeria Ltd/Timmy Fak General Works Ltd
Motorized knapsack sprayer	
13. ANVL/Tornado WFB 18:	Agro Nigerian Ventures Ltd/ Lajibam Auto Agric Concerns Limited
Trombone sprayers	
14. Solo 28 MKI:	Solo Sprayers Limited/ Adewale Oladayo Trading Store Ltd., Nigeria.
15. Matabi Trombone:	Matabi Spain/Insis Crop Care Nigeria.
16. Hudson trombone 61224	HD Hudson Asia Limited/ Harvest Field Industries Ltd., Nigeria
17. Hudson trombone 612219	HD Hudson Asia Limited/ Harvest Field Industries Ltd., Nigeria.

6.1 The method of application of pesticide is dependent on the pesticide formulation (state) amongst other factors; however, application method shall conform to pesticide manufacturer's instruction on usage.

The following are various pesticide applicable techniques applicable to pesticides:

6.1.1 Band applications: This involves applying pesticide in a parallel strips or bands such as between rows of cocoa crops than uniformly over the entire field.

6.1.2 Basal applications: This involves the direct application of herbicides to the lower portions of small tree to control vegetation.

6.1.3 Broadcast applications: This involves the uniform application of pesticide to an entire area of cocoa field.

6.1.4 Direct spray application: This specifically targets the pest to minimized pesticide contact with other non-target plant.

6.1.5 Foliar application: This is the direct application of pesticide to the leafy potions of the plant.

6.1.6 Soil incorporation: This is the use of tillage, rainfall or irrigation equipment to move the pesticide into the soil.

6.1.7 Soil application: This involves placing pesticide directly on or in the soil rather than on growing plant.

6.2 STEPS TOWARDS APPLICATION

One of the more common forms of pesticide application, especially in conventional agriculture, is the use of mechanical sprayer (none the less, other forms of spraying exist, for instant local farmers in rural areas dip brooms in pesticide mixtures and sprinkled on the target plant/crop). Having made sure your equipment is in good working order, and meet the Minimum Requirements for Agricultural Pesticide Application Equipment as found in FAOs Guidelines on Minimum Requirements for Agricultural Pesticide Application Equipment (Volume I). There are four steps to the application using selected mechanical sprayer:

6.2.1 Assessing the target

Where the spray deposit must be put, or sprayed has to be accurately assessed.

6.2.2 Nozzle selection and setting

If your sprayer has a variable hollow cone nozzle, setting should be adequately selected. Noting that “overkill” will result in high residues as well as harming the environment

6.2.3 Calibration

Proper calibrations should be done and therefore the right amount of water (volume rate) and pesticide mixture should be used.

6.2.3.1 The holding capacity of sprayer tank should be noted

6.2.3.2 The area to be treated per tank load should be noted

6.2.3.3 Pesticide calculation should be done to determine the required level of pesticide for specified area to minimize waste and pollution.

6.2.3.4 The tank loads required to spray the whole area should be noted.

6.3 CONSIDERATIONS IN APPLICATION

Only the amount of pesticide needed per application period should be mixed and Spraying should be done evenly and target areas should not be missed (systemic). Pesticides must be used in line with the conditions of the product approval as stated on the label. For approved uses not specified on the label, the conditions given on the relevant notice of approval must also be followed. Unless these documents place a legal obligation on use, or none-use, of a specific type of equipment to apply the pesticide, the product may be applied using methods other than those recommended as long as:

6.3.1 The equipment chosen is suitable for the intended method of applying the pesticide;

6.3.2 The Control of Substances Hazardous to Health (COSHH) assessment, where appropriate, has shown that the proposed method does not involve an increased risk to health or safety compared to the normal method;

6.3.3 The environmental effects of the intended method of applying the pesticide must have been assessed and assessment must have shown there is no increased risk to wildlife or the environment; and

6.3.4 The necessary control measures are in place to reduce, as far as is reasonably possible, the risks to people, wildlife and the environment.

7. PROCEDURE IN SPRAYING OF PESTICIDE

Good Agricultural Practice (GAP) and Good Warehouse practice (GWP) requires good timing and proper application of pesticide, In achieving these, the following are recommended:

- Follow the manufactures direction
- Pesticide should be applied in the morning or in the evening
- Farmer should cheek wind directions while spraying to prevent wind interference.
- Pesticide should not be sprayed when it is raining
- Spray on the advice of specialists (agronomist) at an appropriate time in the reproductive cycle of the pest.

7.1 APPLICATION METHODS IN STORAGE

Insecticides, including fumigant treatments, are chemical methods for controlling storage insects. The most common methods of application have included:

7.1.1 Enclosing a fumigant with the sacks under a gas-proof sheet.

When properly executed, this is usually the most effective method of insect control and when used correctly is safe and least likely to lead to residue problems.

Phosphine (phostoxin) is a toxic gas that is generated from sachets containing metal phosphides. It is slowly released among bags covered by a gas-proof sheet: which is held down by “sand snakes” or similar weights.

With phosphine, the covered stack is typically left for between 5 and 16 days, and then opened up to allow the gas to escape. The time should depend on the

temperature and the commodity, but is never less than 96 hours (Whereas methyl bromide was popular because it was effective in less than 3 days).

7.1.2 Introduction of fogs into enclosed spaces such as containers.

The application of insecticides (*e.g*. synergized pyrethroids) using thermal foggers to kill flying insects such as warehouse moths shall be done with care in enclosed area to obtain maximum result.

Treatment of the wooden pallets on which cocoa sacks are stored should be moderated especially for the control of termites as high insecticide residues in produce can arise from indiscriminate treatment of pallets, and greater care should be put in application and handling. These include:

7.1.2.1 Treating successive layers of sacks as the stack is built

7.1.2.2 Space treatment with a pyrethroid UL formulation: using a thermal fogger before closing a container

7.1.2.3 Fumigating sacks under sheets with phostoxin generating sachets (aluminum phosphide)

8. SPRAYING OF PESTICED ON STORED COCOA

After all necessary hygienic precautionary steps have been taken and the most appropriate application equipment selected, the actual application of the pesticide shall be done as follows,

8.1 The loaded Sprayer (or flit or any other equipment used in pesticide administrating) shall be positioned several inches from the stored cocoa depending on the instruction on the pesticide.

8.2 After which, the trigger of loaded sprayer shall be compressed carefully and ensure the target (stored cocoa or the entire store) is hit adequately and conservatively.

8.3 The spraying (i.e. actual compression of the spray trigger) should be controlled to reduce wastage.

8.4 The spraying shall be from the center of the storage area first because Good Practice states that spraying shall be done by the operator on the body of field first before going round the outer edge last.

8.5 Sufficient time shall be allowed to elapse between application (spraying of pesticide on stored cocoa) and processing of the stored cocoa or sale in market to enable (any) residue to degrade to acceptable levels (*i.e*. the MRL)

It should be noted that reducing the dosage reduces the time to which acceptable levels are reached, but pest control may be impaired.

8.6 For purpose of personnel hygiene and safety, eating, drinking or smoking should never be done while spraying

9. PRACTICES IN POST PESTICIDE APPLICATION

9.1 Cleaning Up

9.1.1 After spraying the sprayer should be cleaned first

9.1.2 Then the operator of the sprayer washes himself and clothes, but should never dispose of washing water near water sources (use waste ground away from children and animals)

9.1.3 All equipment shall be rinsed with water in a grassy area. Never clean up on a hard surface.

9.1.4 Pesticide residue shall never be flushed into a storm drain or any type of drain.

9.1.5 Washing with soap and water shall be done before eating, drinking, smoking, or going to the bathroom.

9.1.6 Clothing worn during spraying should be washed separately.

9.1.7 Mouth should not be used to clean nozzle or to prime your sprayer.

9.2 Proper Disposal of Pesticide Containers

9.2.1 Before discarding an empty container, It shall be half filled with water, Shaken and rinsed. The rinsed water shall be emptied into the sprayer and sprayed into a grassy area. This shall be done three times. This process will also clean the sprayer bottle and hose.

9.2.2 Once the container has been completely rinsed, punch a hole in the bottom. Wrap the container in newspaper and place in the trash.

9.2.3 Empty containers should not be burnt.

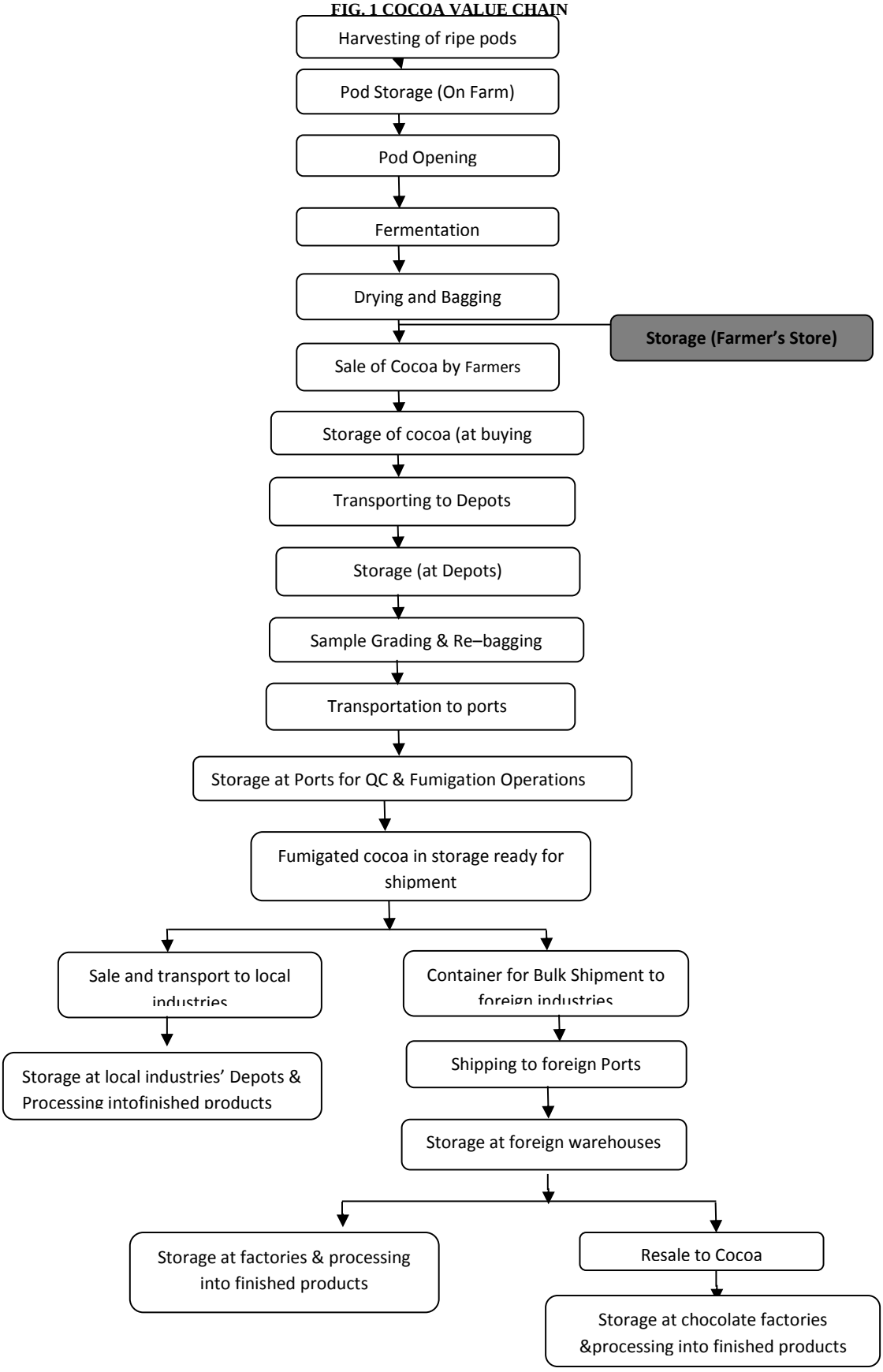
9.2.4 As much as possible containers shall not be recycled. And If pesticides must be recycled, bottles: should be rinsed at least 3 times before disposal. If possible, use the water for rinsing in the next spray tank load

9.2.5 If sachets are used, they should be disposed carefully.

APPENDIX I

APENDIX II

FIG. 1 COCOA VALUE CHAIN



Appendix II

CODEX MRLS THAT APPLY TO COCOA BEANS*

Maximum Residue Limits for Cacao beans (commodity code SB 0715)

Pesticide	MRL	Year of Adoption	
Hydrogen Phosphide	0.01 mg/Kg		Po
Thiamethoxam	0.02 mg/Kg	2011	(*)
Clothianidin	0.02 mg/Kg	2011	(*) T
Endosulfan	0.2 mg/Kg	2007	
Metalaxyl	0.2 mg/Kg	1991	
Methyl Bromide	5 mg/Kg	1999	Po

(*) At or about the limit of determination.

Po: The MRL accommodates post-harvest treatment of the commodity.

T: Temporary?

Appendix V

3D Pesticides that MUST NOT BE USED for cocoa

Active ingredients	MoA group	EU, MRL status § and notes
Insecticides		
acephate	1B	N
amitraz	19	N Ĵ
aldrin	2	N Class 1
azinphos-methyl	1B	N Class 1
cabaryl	1A	N
carbofuran	1A	N Class 1 as spray formulation
carbosulfan	1A	N
cartap	4C	N
cyhalothrin (unresolved)	3	N α
cyhexatin (acaricide)	12B	N Ĵ
DDT	3	N Φ (may be used for IRS)
dichlorvos (DDVP)	1B	N Class 1
dieldrin	2	N Class 1
dioxacarb	1A	N
endosulfan	2	N (MRL 0.1 mg/kg) * Class 1
lindane, gamma BHC, HCH	2	N * Φ
methyl-parathion (= parathion-methyl)	1B	N * Φ Class 1
methomyl	1A	N β Class 1
monocrotophos	1B	N Φ Class 1
profenfos	1B	N
promecarb	1A	N Class 1
propoxur	1A	N
terbufos	1B	N Class 1
Herbicides		
ametryn	C1	N
atrazine	C1	N
diuron	O	N*
fomesafen	E	N
MSMA (methyl arsenic acid)	Z	N
2,4,5-T	O	N Ĵ
Fungicides		
benomyl	B1	N δ
captafol	M4	N Φ Ĵ
hexaconazole	G1	N
pyrifenox	**G1**	**N**
triadimefon	**G1**	**N**
tridemorph	**G2**	**N**
zineb	**M3**	**N**
Stored produce		
allethrin (esbiothrin)	3	N
fenitrothion	1B	N
isoprocarb (MIPC)	1A	not listed ø
permethrin	3	N
resmethrin	3	N
tetramethrin	3	N

* High residue levels have been found, within the last 5 years, in imported produce to the EU and/or Japan

Cocoa growers are strongly advised to stop using any products containing any AI listed here. Where they have been used in the past for cocoa pests, there should be satisfactory substitutes for them now recommended

They include:

- obsolete and banned compounds (*e.g.* aldrin, lindane).

α Note: as with metalaxyl, unresolved cyhalothrin is not included on Annex 1, but the isomer lambda-cyhalothrin (used for mirid control) is included.

§ compounds not included on 91/414/EEC Annex 1 and are not thought to be essential for cocoa production.

Ĵ Compounds specifically listed at LOD for cocoa in Japan

Φ Pesticides listed in the PIC Convention

ø P pesticides are used outside the EU but for which no toxicological data and no MRLs have been notified for inclusion (in the form of import tolerances, nor by third countries). Such compounds may have a clear purpose outside Europe (*e.g.* fenobucarb and isoprocarb: which are widely used for control of hemipteran pests of rice in Asia, and have also been applied to cocoa in certain countries).

β Also breakdown product of thiodicarb

δ Breaks down into the permitted compound carbendazim

BIBLIOGRAPHY

I. Factors determining the extent of pesticide use in Nigerian farms Tijani1 , A. A. and Sofoluwe1 , N. A. Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria

II. Problems associated with pesticide usage and application in Nigerian cocoa production: A review E. U. Asogwa* and L. N. Dongo Crop Protection Division, Cocoa Research Institute of Nigeria, Ibadan, Nigeria

III. Good agricultural practices for sustainable cocoa production: a guide for Farmer Training, Development and Environment - Revision 2011, by By Richard Asare and Sonii David

IV. The Ohio State University Extension, Tailgate Safety Training module for Landscaping and Horticulture Service,

V. Rational pesticide use: Spatially and temporally targeted application of specific products. In *Optimising Pesticide Use* Ed. Wilson, M F (2003) Pub. Wiley; Bateman R (2003)

VI. Pesticide Use Practices and Safety Issues: The Case of Cocoa Farmers in Ondo State, Nigeria, by A. A. Tijani J. Hum. Ecol., 19(3) 183-190 (2006)

VII. A new system to protect stored cocoa beans from insects Without the use of methyl bromide , by Stephen w. Bullington.

VIII. ICA-Cocoa-pesticides-ICCO-list.

IX. Cocoa Research Institute of Nigeria (CRIN)

X. Code of practice for using plant protection products, 2006

XI. Codex Alimentarius Commisions Pesticide Residues in Food and Feed Commodity Details 2013**.**