

Republic of Ghana MINISTRY OF LANDS AND NATURAL RESOURCES

# FOREST INVESTMENT PROGRAMME (FIP)- ENHANCING NATURAL FORESTS AND AGROFOREST LANDSCAPES

**ADDITIONAL FINANCING** 

Updated PEST MANAGEMENT PLAN (PMP)

November 2018

### TABLE OF CONTENTS

TABLE OF CONTENTSI		
LIST OF	TABLES	II
ACRON	IYMS AND ABBREVIATIONS	III
EXECU	TIVE SUMMARY	v
1.0	INTRODUCTION	1
1.1	Project Background and Aims	1
1.2	Objectives	1
2.0	PROJECT DESCRIPTION	2
2.1	OVERVIEW OF PROJECT AND COMPONENTS	2
2.2	PROJECT STAKEHOLDERS AND BENEFITS	6
2.3	SUMMARY OF ADDITIONAL FINANCING PROGRAM ACTIVITIES	6
2.4	IMPLEMENTING AND COLLABORATING INSTITUTIONS	7
3.0	REGULATORY AND INSTITUTIONAL FRAMEWORK	8
3.1	Regulatory Framework	8
3.	1.1 National	8
3.	1.2 Some key International Conventions	9
3.2	NATIONAL INSTITUTIONS RESPONSIBLE FOR THE SAFE MANAGEMENT OF AGRO-CHEMICALS/PESTICIDES	11
3.	2.1 Public sector institutions	11
3.	2.2 Non-Governmental Organisations/Private Institutions	13
3.3	INTERNATIONAL INSTITUTIONS	15
4.0	CURRENT SITUATION, PROBLEMS AND ANALYSIS	17
4.1	Some major crops and their pest and diseases	17
4.2	Common Pests/diseases of cocoa in Ghana	
4.3	COMMON PESTS/DISEASES OF FOOD CROPS IN THE PROJECT AREA	
4.4	MANAGEMENT AND USE OF PESTICIDES	19
4.	4.1 Production and importation of pesticides	20
4.	4.2 Organisation and practices followed in sale and distribution of pesticides	20
4.	4.3 Abuses in pesticide supply and sales	20
4.	4.4 Use of pesticides by farmers:	21
4.	4.5 Management of empty pesticide containers	21
4.	4.6 Accidents resulting from pesticide use	21
4.5	GENERAL HEALTH PROBLEMS AND ENVIRONMENTAL HAZARDS ASSOCIATED WITH PESTICIDES	
5.0	PEST MANAGEMENT ACTION PLAN	23
5.1	INSTITUTIONAL RESPONSIBILITY FOR THIS PMP	23
5.2	Actions, Methods and Measures	23
5.	2.1 Mitigating insects and pest damage to plantation	26
5.	2.2 Mitigating impact at the mined-out areas	26

5.3	TRAINING AND CAPACITY BUILDING FOR THIS PMP	26
5.4	Monitoring and Evaluation	27
5.5	Reporting and Review Arrangement	28
6.0	IMPLEMENTATION BUDGET	29
7.0	BIBLIOGRAPHY	30
<b>7.0</b> ANN	BIBLIOGRAPHY	<b>30</b>

### LIST OF TABLES

TABLE 1: COMMON PESTS AND DISEASES ASSOCIATED WITH COCOA IN GHANA	16
TABLE 2: COMMON PESTS AND DISEASES ASSOCIATED WITH MAIZE, PLANTAIN AND CASSAVA IN GHANA	17
TABLE 3: SOME MANAGEMENT ACTIONS FOR SAFE USE OF PESTICIDES	22
TABLE 4: MONITORING INDICATORS	25
TABLE 5: BUDGET ESTIMATES	27

# ACRONYMS AND ABBREVIATIONS

AfDB	Africa Development Bank	
AgSSIP	Agricultural Services Sub-Sector Investment Program	
CBOs	Community-based Organisations	
CCMC	Chemicals Control and Management Centre	
CEPS	Customs Excise and Preventive Service	
COCOBOD	Ghana Cocoa Board	
Codex	Code Alimentarius Commission	
CREMA	Community Resource Management Area	
CRI	Crops Research Institute	
CRIG	Cocoa Research Institute of Ghana	
DGM	Dedicated Grant Mechanism	
EPA	Environmental Protection Agency (Ghana)	
ESMF	Environmental and Social Management Framework	
EU	European Union	
FAO	Food and Agriculture Organization of the United Nations	
FBOs	Farmer Based Organisations	
FC	Forestry Commission	
FCPF	Forest Carbon Partnership Fund	
FIP	Forest Investment Program	
FORIG	Forest Research Institute of Ghana	
FSD	Forest Services Division	
GAABIC	Ghana Agricultural Associations' Business and Information Centre	
GAIDA	Ghana Agro-Input Dealers Association	
GAP	Good Agricultural Practice	
GCAP	Ghana Commercial Agricultural Project	
GFAP	Ghana Federation of Agriculture Producers	
GHS	Ghana Health Service	
GoG	Government of Ghana	
GSA	Ghana Standards Authority	
HFZ	High Forest Zone	
IFC	International Finance Corporation	
IPM	Integrated Pest Management	
IPPC	International Plant Protection Convention	
ISO	International Standards Organisation	
ISPM	International Standards for Phytosanitary Measures	
IUCN	International Union for Conservation of Nature	
LI/L.I.	Legislative Instrument	
MLNR	Ministry of Lands and Natural Resources	
MOFA/MoFA	Ministry of Food and Agriculture	
MRL	Maximum Residue Limit	
MRV	Monitoring Reporting Verification	
NCRC	Nature Conservation Resource Centre	

Non-Governmental Organisations
National Plant Protection Organisation
Natural Resources and Environmental Governance
Operational Policy
Project Implementation Committee
Pest Management Plan
Persistent Organic Pollutant
Plant Protection and Regulatory Services Directorate
Reducing Emissions from Deforestation and Forest Degradation and others
Seed Producers Association of Ghana
Sanitary and Phytosanitary Agreement
United Kingdom
United Nations International Development Organisation
Vegetable Producers Exporters Association of Ghana
World Bank
Water Resources Commission

### **EXECUTIVE SUMMARY**

### Introduction

The Government of Ghana requested additional financing (AF) for Ghana Forest Investment Program (FIP) - Enhancing Natural Forest and Agroforest Landscapes (ENFAL) Project (P163745). The proposed additional financing (AF) activities are focused on supporting the Government of Ghana (GoG)'s efforts to address the impacts of illegal artisanal mining (ASM) on forests, community agroforestry areas and natural landscapes through improved coordination and implementation of policies, testing of mine site clean-up and reclamation approaches, including tree planting and plantation establishment, with community and media engagement, and communication, outreach and training activities.

Ghana Forest Investment Program (FIP) - Enhancing Natural Forest and Agroforest Landscapes (ENFAL) Project (P163745) triggered O.P 4.09 and a Pest Management Plan (PMP) was prepared to promote Integrated Pest Management (IPM) and application of pesticide to minimize risks to human health and the environment. The PMP was disclosed by the Bank's InfoShop. This PMP is an update to address potential risks of pesticides on human health and ecosystem. The updated PMP has specifically considered the key focus areas of the new program which includes activities to reclaim degraded mined out areas in forests and supporting the establishment of community and private sector led tree plantations development in the Ashanti, Eastern and Western Regions of Ghana.

The specific objectives of this PMP are to: (i) ensure integration of appropriate pest management techniques into agro-forestry technologies, and cocoa landscapes on farms supported under the project; (ii) monitor pesticide use and pest issues among participating farmers, admitted farmers and local communities; and (iii) provide for implementation of an IPMin the event that serious pest management issues arise, and/or the introduction of sustainable forest management technologies leading to significant increase in the application of pesticides.

# **Project Description**

The Ghana FIP has four components: 1) Policy Reforms and Institutional Strengthening; 2) Pilot Investments for Improved Forest and Landscape Management with Communities; 3) Innovation, Capacity Building; and Communications; and 4) Project Management, Monitoring and Coordination. The Additional Financing (AF) will follow the same structure. There is evidence of success for many activities including the safeguards being implemented under the original FIP ENFAL, and at mid-term, progress towards the achievement of project development objective (PDO) has been rated as Moderately Satisfactory (MS). However, drivers of deforestation and degradation continue to degrade Ghana's rural landscape. The pace of expansion of illegal ASM in recent years has accelerated forest and agroforest loss in affected areas and the challenges associated with private plantation development persist. The FIP AF is designed to support demonstration pilots that can inform and influence the important steps that can help support to combat deforestation in the cocoa sector and commitments to address illegal mining through scaled up action. The proposed additional activities are focused on supporting the efforts to address the impacts of illegal ASM on forests, community agroforestry areas and natural landscapes through improved coordination and implementation of policies, testing of mine site clean-up and reclamation approaches, including tree planting and plantation establishment. Specifically, additional financing is supporting two news interventions: (i) supporting the rehabilitation of mined out areas towards reduction of degradation and deforestation due to illegal artisanal small-scale mining (ASM) in forest landscapes, and (ii) the enhancement of private investment in forest plantation development.

The proposed specific program areas under the additional financing are summarized in the listing below:

Reclamation of forest lands degraded through mining

- Mapping and Prioritization of Affected Areas;
- Mapping and Characterizing Mining Degradation in Cocoa Landscapes;
- Testing of Rehabilitation Approaches and Sequencing of Interventions;
- Productive Species for Rehabilitation;
- Engagement with Local Land Use Planning Processes;
- Leveraging Communication Platforms and Community Engagement.

# <u>Plantation development</u>

- Support to private plantation developers:
  - Incentivize private plantation developers to expand planted areas;
  - Support may include: Low cost tree seedlings of economic species; transport and delivery of the seedlings; training, tools and equipment for site/ soil preparation, planting / spacing, and care / nurture;
  - Low cost loans will be considered for financially viable firms (based on financial assessment / due diligence and track record;
  - Incentive payments are conditional: on compliance with seed quality and stand maintenance/weeding standards;
  - TA for skills development in tree planting and nurturing, business planning, species selection, mapping and land titling/clearing services;
  - Professional monitoring, TA to keep investments on track.
- Alternate community livelihood support:
  - TA and support for cash crops and local food crops grown within plantation systems;
  - Intercropping assistance with plantation maintenance and weeding;
  - $\circ$   $\;$  Provides early income in advance of the first thinning and timber harvest.

# Current approaches to pest management in the project sector in the country

The main crops that require pest management and control are cocoa, maize, plantain and cassava. Details of the extent of attack including symptoms have been outlined in the report. Some common pests and diseases associated with cocoa in the program area are the black pod, brown root rot, cocoa necrosis, collar crack, collar rot, pot rot swollen shoot, white rot, mealy pod and mistletoe. Common pests and diseases associated with maize are armyworms, larger grain borers, greater grain weevil, stem borers, maize streak virus and striga. The most common pest and disease of plantain are the Nematode and Sigatoka respectively. Some common pests of cassava are Cassava Meallybug, Cassava Green Mite, Variegated Grasshopper, White Flies, Grass cutter. Some common cassava diseases are: Cassava Mosaic, Cassava Bacteria Blight, Cassava Anthracnose, and Cassava Roots Pot. IPM strategies are required even though there is no one control practice/measure that can provide acceptable control for any targeted pest.

#### Current issues in the use and management of synthetic chemical pesticides

There are acute and chronic health effects including skin irritations, such as itching, rashes, blisters, burns, wounds, irritation of throat leading to cough or difficulty in breathing with or without wheezing or choking, etc. current management issues on pesticide include the following:

- **Production and importation of pesticides:** Every pesticide produced in Ghana and also imported is subjected to formal permitting by the regulatory agency, the EPA. In order to ensure that it is done efficiently, Phytosanitary Controls are stationed at the borders (sea ports, airports, and roads) which are manned by the PPRSD of the MOFA and are assisted by custom officials at the entry points. The control of pesticides is also done in principle at the distribution level in the small towns/villages through decentralized services offered by MOFA.
- Organisation and practices followed in sale and distribution of pesticides: The main suppliers feed the market through distributors who in turn serve the retail traders. Some distribution shops – sales point- are well managed and the products are displayed on shelves in accordance with standard practice. However, at most retailing shops in small towns and villages, their practices are usually sub- standard because of inadequate official monitoring and enforcement.
- Abuses in pesticide supply and sales: The abuses associated with the supply and sale of pesticides include: use of banned and or unregistered pesticides, see Annex 1; decanting of pesticides into improper containers without appropriate labels; supply and sale by unauthorized persons /persons who do not have EPA/PPRSD license and permits; and supply and sale of adulterated and or expired pesticides. Some dealers exploit the low level of literacy of the peasant farmer who cannot tell the difference between fake and genuine products and because of poverty is inclined towards buying the cheap but fake product.
- Use of pesticides by farmers: Farmers apply the pesticides by spraying, on their farms. Unfortunately, there is very little personal protection such as hand gloves, overalls, timing of application, wind direction at application. The time of spraying during the day also compounds the risk (spraying during hot afternoons). The documentation to allow official monitoring and provide product traceability is very scarce and, in some cases, non-existent.
- **Management of empty pesticide containers:** The disposal of empty pesticide containers rests mostly with resellers and farmers because of the inefficient retail sales network. They are not equipped for this responsibility and usually resort to different disposal means, including farmers/buyers reusing empty containers for drinking water storage purposes, and open burning of used containers.

# Policy, Legal and Institutional Framework

The relevant national laws governing environmental pollution, plant protection, and pest and pesticide management and control include the following:

• Guidelines for the National Plant Protection Policy, June 2004

The overall goal of the national plant protection policy is to achieve an efficient system that ensures that crop losses caused by biological, environmental and ecological factors are contained in a sustainable, and economical manner. There are thirteen (13) principles underlying the Plant Protection Policy and these include:

- 1. Capacity building at national, regional and district levels
- 2. Intra and inter-ministerial collaboration
- 3. Private sector involvement
- 4. Partnerships with international development partners
- 5. Regional and international cooperation

### 6. Legislation

- 7. IPM
- 8. Coordination of IPM Activities
- 9. Contribute to IPM research
- 10. International trade
- 11. Planting materials production
- 12. Compliance
- 13. Participatory approaches and farmer empowerment

Three of the underlying principles, namely principle 7, 8, and 9 provide for integrated pest management (IPM) issues. Principle 7 on IPM specifically states that: promoting Integrated Pest Management (IPM) as the standard plant protection strategy for all crops to effectively reduce crop losses with minimum pesticide use.

### • National Land Policy

The National Land Policy provides for the protection of water bodies and the environment in the long term national interest under any form of land usage be it for human settlements, industry and commerce, agriculture, forestry and mining. Two key aspects of Section 4.4 (Ensuring Sustainable Land Use) of the Policy relevant to the Project is provided below:

(h) In general, land use involving mining, other extractive industries, mechanised agriculture, cattle ranching, dairy farming and manufacturing industry will have to conform to prescribed environmental conservation principles and guidelines.

(m) All land and water resources development activities must conform to the environmental laws in the country and where Environmental Impact Assessment report is required this must be provided. Environmental protection within the 'polluter pays' principle will be enforced.

#### • National Water Policy

The National Water Policy, approved in June 2007, is to provide the framework for the sustainable development of water resources in Ghana. The overall goal of the policy is to "achieve sustainable development, management and use of Ghana's water resources to improve health and livelihoods, reduce vulnerability while assuring good governance for present and future generations.

Relevant policy measures to be undertaken which are in conformity with the ENFAL include:

a) (Policy measure iv) encourage the efficient use of fertilizers to reduce pollution of water bodies and ensure conservation of water;

b) (Policy measure VI) manage land use and control land degradation, including bush fires, to reduce soil loss and situation of water bodies.

There is no mention of pests or pesticides usage in the policy. However, water quality concerns can be sited in many instances in the policy document which could generally encompass pollution concerns not only from fertilizers (which is categorically mentioned) but also from pesticides as well.

#### • National Environment Policy/Action Plans

The policy aims at ensuring a sound management of resources and the environment, and to avoid any exploitation of these resources in a manner that might cause irreparable damage to the environment. Specifically, it provides for maintenance of ecosystems and ecological processes essential for the functioning of the biosphere, sound management of natural resources and the environment, and protection of humans, animals and plants and their habitats. The policy objectives are clearly in line with integrated pest management principles.

- Environmental Protection Agency Act, 1994, Act 490: This law aims at controlling the volumes, types, components, wastes effects or other sources of pollution elements or substances that are potentially dangerous for the quality of life, human health and the environment. Part II of the Act which dealt with pesticides control and management, provides the rules for registration, pesticides classification, approval, clearance, using, disposing of and non-disclosure of confidential information, the granting of licence, labelling, and pesticides inspections.
- Environmental Assessment Regulations, 1999, LI 1652: The regulation list activities for which an environmental assessment is mandatory and describe the procedures to be followed to obtain permits for both existing and proposed undertakings through the conduct of environmental impact assessments and preparation of environmental management plans.
- *Plants and Fertilizer Act, 2010, Act 803*: this Act combines the Seed Inspection and Certification Decree, NRCD 100 of 1972 and the Prevention & Control of Pests and Diseases of Plants Act of 1965, Act 307. The Act provides for the efficient conduct of plant protection to prevent the introduction and spread of pests and diseases to regulate imports and exports of plants and planting materials; the regulation and monitoring of the exports, imports and commercial transaction in seeds and related matters; and control and regulation of fertilizer trade.

Relevant international conventions ratified by Ghana include: The International Plant Protection Convention (IPPC); International Code of Conduct for the distribution and use of FAO pesticides; The Basel International Convention on the Transboundary Movement of Hazardous Waste of March 22, 1989; The Rotterdam Convention on Prior Information and consent; The Basel Convention on Persistent Organic Pollutants (POPs); International Standards for Phytosanitary Measures (ISPM) FAO; The Montreal Protocol.

**Institutional Framework:** The key national institutions responsible for the safe management of agrochemicals and its related matters are presented below:

- Environmental Protection Agency (EPA): The EPA and in particular its Chemical Control and Management Centre (CCMC), responsible for pesticides control and management, has offices in all regions as well as three district offices. It has the oversight responsibility for pest management and control and including registration of pesticides, limitation or banning of the use of a pesticide if necessary, and granting of licenses to all categories of pesticide dealers.
- The Ghana Standards Authority (GSA) has the responsibility of ensuring the quality of the infrastructure including the Metrology, Standards, Assessment/Test and Quality control (MSTQ). The Authority makes routine analyses of pesticides residues in fruits and vegetables in order to facilitate the exportation of these products and also protect the public health and ensure safety.
- *The Customs, Excise and Prevention Service (CEPS)* works in close collaboration with the EPA. The importation reports of chemical products are submitted by the CEPS to the EPA on a

quarterly basis. The CEPS staff are members to the various technical committees of the EPA including the Hazardous Waste Committee and the Pesticide Technical Committee.

- Ghana Cocoa Board (COCOBOD) is directly under the Ministry of Finance and the functions of COCOBOD centre on the production, research, extension, internal and external marketing and quality control. COCOBOD through its subsidiaries screen all pesticides used in the cocoa industry to ensure compliance, regularly update farmers' skills in the application of pesticides including extension and ensure quality control measures.
- The Ministry of Food and Agriculture (MoFA) houses the Plant Protection and Regulation Services Directorate which is responsible for the regulation of pesticides use in the country. The directorate has the Crop Pests & Disease Management Division, the Pesticide and Fertilizer Regulatory Division, the Ghana Seed Inspection Division, and the Plant Quarantine Division

#### **Project Integrated Pest Management Measures (IPMM)**

- Mitigating insects and pest damage to plantation: Under the private plantation development intervention to be implemented, insects and pest damage to trees could be a serious problem in plantation development especially where the intensive forest farming system is practiced. This could be experienced at the early stage of development which involves nursery establishment. The most common insects which cause severe damage to plantations are defoliators and stem borers. Defoliator insects cause severe defoliation and, hence, reduce growth rate. Stem borers cause severe damage; in young plantations (1-5 years old) damaged trees may die back or top break causing a reduction in growth rate and stem quality. Pest and insects cause severe damage to the standing trees and reduces the value of timber, and therefore, could require application of both chemical and biological agents. This is however not a serious challenge for the project because, teak and cedar species which are the recommended for plantation development are resistant to current defoliators and stem borers. If they become a challenge in the course of implementation, silvicultural treatments such as weeding, control burning, thinning, and intercropping would be followed. These methods can reduce the insect populations and improve both the growth rate and quality.
- Mitigating impact at the mined-out areas: Under the intervention on the rehabilitation of degraded mined-out areas, it is anticipated that there would not be need for pest management. However, should the need arise as a result of rehabilitation and restoration of mined-out areas with plantation development, the pest management measures explained above would be followed in addressing and mitigating insect and pest damage to plantation development.

Actions, methods and measures: The actions, methods and measures included Pest Inventory, Prevention of new Pest Infestation, and Management of established pests.

- *Pest Inventory:*\_The project through the district FSDs will continue to collaborate with MoFA, COCOBOD, farmers groups to identify any types, abundance and location of pest plants and animals by conducting regular seasonal interviews and surveys among farmers, and relevant district level institutions as well as CBOs/community-based farmer organisations.
- *Prevention of new Pest Infestation*: The PMP will endeavour to treat and manage any new pest infestations as soon as they are identified.
- Early Detection and Eradication: A process for the reporting and identification of unusual plants and animals as already set up by the MOFA will be followed. Local and admitted farmers will be required to report unusual plants, animals and pests to the district FSD, MoFA or COCOBOD extension officers or to the nearest farmer group or association. The district FSD will also collaborate with the district MoFA and COCOBOD extension officers to carry out periodic (seasonal) interviews with farmers on new or strange plants/pests/animals damaging their crops to detect new infestations.
- *Prevention of Spread:* The PMP will follow laid down MOFA protocols for appropriately managing risks of all human assisted transport of declared pests.
- *Management of established pests:* The PMP will ensure that established pest infestations are effectively managed by following protocols developed by MOFA. Priorities for pest management will be regularly reviewed.

Some management actions of safe use of pesticides

Issue	Management Action
Avoid crops (varieties) that	Obtain planting materials of crops varieties that have been proven, through     local field trials, to demonstrate acceptable levels of resistance or tolerance
create reliance	to major nests and diseases from CSIR- or MoFA agricultural centres. The
on pesticides	District MoFA offices will continue to provide guidance.
Assure access	The project through District FSD safeguard officers and the District MoFA
to protective	officers will provide strict supervision of the use and maintenance of
clothing and	protective clothing which must be changed and washed regularly. Spray
spray	equipment must be regularly checked and serviced by qualified spray
equipment in	equipment mechanic who should undertake routine equipment
repair	maintenance on a clearly defined work programme. Furthermore, spray
	operators will be provided practical training on how to recognize faults in
	spray delivery and equipment performance so that they can make early
Accura proper	Complaint of any signs of equipment mainunction.
labelling of	<ul> <li>Since most of the pesticides used in Ghana are imported as formulated products. District ESD will work closely with MoEA staff to ensure that the</li> </ul>
nesticide	labels on containers of nesticides used in their respective districts are
products	appropriate and contain all the information as required by the Pesticide
F	Registration and Control scheme. They will continue to engage farmers and
	train them on the safe storage and use of the chemicals.
Prevent reuse	A major source of pesticide poisoning is careless disposal of used pesticide
of pesticide	containers which are often collected and re-used for storing drinking
containers	water, fuel and cooking oils. The project at the national level may consider
	teaming up with the NGO, Crop-life Ghana and also in collaboration with
	district ESD will maintain regular programme of public awareness
	education and training of all categories of farm workers on the risks
	associated with reuse of pesticide containers.
Pre-harvest	• District FSD will continue to work with farmers to ensure that content in
interval	the safe and effective use of pesticides trainings/sensitizations always
violations	includes adequate attention to pre-harvest intervals between the last
	pesticide application and harvest. Strict compliance with this interval,
	which will vary with crops and pesticide would minimize the risk of
	unacceptable high level of pesticide residues in harvested products. This is
Unsafe	• The FC will work with the FPA to ensure that extreme care is taken in the
storage.	transportation, storage and handling of pesticides. Pesticides should be
transport and	transported in well-sealed containers and isolated from other materials in
handling	the vehicles. Regional EPA and FSD will carry out random checks and
	outcome adequately documented. The District FSD will work with farmers
	to ensure provision of special pesticide stores in- farm. Entry into and
	handling of the products should be restricted to only a few persons who
	have received adequate training in the proper management of pesticides
	the proper bandling of pesticides
Application by	<ul> <li>It is often observed that women apply pesticides either with the child at</li> </ul>
women and	their back or leave them under shade of trees in the farm and later breast
children	feed them without first washing and changing their clothes thus increasing
	the chance of contaminating the children in the process. The project will
	support District FSD together with MoFA to train pesticide inspectors to
	monitor and ensure that such practices stop and possibly exclude women
	from applying pesticides and also completely avoid situations where

Issue	Management Action	
	children are exposed to pesticides.	
Potential for using pesticides more than necessary	<ul> <li>A basic principle of integrated pest management is judicious use of pesticides in the context of IPM. This means that the use of chemical pesticides must only be as a last resort, for example, in the case of unexpected pest invasion by migratory pests such as armyworms and grasshoppers or grain eating birds. Pesticides must also only be used when it is economic to do so on a needs basis.</li> </ul>	
Use lower- toxicity products	• The WHO hazard classification of pesticides as well as the list of products approved by the EPA based on WHO hazard classification, should be used as the guide for the choice of pesticides for use in crop protection. As much as possible, farmers should be prevented from choosing class 1a and 1b pesticides and trained to use pesticides only within class 111. If pesticides in class 11 must be used, every effort must be made to ensure that adequate safety precautions are taken on safe use of products and the protection of applicators.	
Discourage pesticide spraying near homes	<ul> <li>The surroundings of homes should always be avoided when spraying pesticides, except in vector control programmes when it is necessary to undertake indoor spraying with pesticides on walls of homes, and under very strict supervision and monitoring by officials from the Ministry of Health.</li> </ul>	
Avoid products and spray locations that might contaminate ground and surface water	<ul> <li>In addition to avoiding spraying around domestic homes, every precaution will be taken to minimize spraying near standing water bodies or streams or pouring pesticides on the ground around homes, near wells and playing grounds. In particular, spray operators will be trained on the risks associated with (a) pouring excess pesticide mixtures in rivers, streams or ponds, (b) washing pesticide application equipment in rivers, streams, ponds and other water bodies and (c) discarding empty pesticide containers in rivers, streams and ponds.</li> </ul>	

**Implementation arrangement and responsibilities:** The responsibility for implementing the PMP rests with the MLNR/ FC. However, a close collaboration is required with the EPA and MoFA (PPRSD) to successfully implement the Plan. Their respective regional and district offices will have the capacity and resources to perform their duties satisfactorily including COCOBOD and all relevant farmer-based organisations or groups. All site-specific activities requiring pesticide use and management will be identified early by the District FSDs and included in a pest management planning process to be developed in close association with the district MOFA officers and other stakeholders. The regional FSD will compile a database of all key persons in pesticide management from the relevant district and regional MoFA, COCOBOD, and farmer groups which will be shared among all stakeholders.

**IPM Capacity Building:** The AF of the FIP will continue to collaborate with MoFA to provide basic training in Integrated Pest Management (IPM) and Good Agricultural Practices (GAP) to beneficiary local farmers and key NGOs also providing support to cocoa farmers. The purpose of the capacity building of beneficiary farmers in particular is to encourage farmers to develop their IPM approaches to the management of pests and diseases under the FIP Project. The farmers will learn cultural, biological and ecological processes underpinning IPM options, and use the newly acquired knowledge to choose compatible methods to reduce losses in production and post-harvest storage. A total budget estimate of USD 472,000 is allocated for capacity building, support to advisory services and project management.

**Monitoring and Evaluation.** The district FSD will liaise with the respective district MOFA for regular monitoring and evaluation of control programs to determine the level of progress being made in controlling the spread of any declared plant pests and the reduction of infested areas. The following monitoring indicators will be incorporated into a participatory monitoring and evaluation plan. So far, the level of success has not been high but with the current emphasis on the appointment and empowerment of District FSD safeguard officers and their training, better prospects are expected.

No	Area	Indicators
1	Training and awareness creation	<ul> <li>category and number of extension agents and farmers educated or trained on pests and pesticide issues;</li> <li>practical skills/techniques most frequently demanded by extension agents and farmers;</li> <li>crop/livestock management practices preferred by farmers.</li> </ul>
2	Technology acceptance/ field application	<ul> <li>category and number of farmers who correctly apply the skills they had learnt;</li> <li>new management practices adopted most by farmers;</li> <li>types of farmer-innovations implemented.</li> <li>level of pest damage and losses;</li> <li>rate of adoption of IPM practices;</li> <li>impact of the adoption of IPM on production performance of farmers.</li> </ul>
3	Project direct benefits	<ul> <li>increase in crop/livestock production;</li> <li>increase in farm revenue;</li> <li>social benefits: e.g., improvement in the health status of farmers;</li> <li>level of reduction of pesticide purchase and use.</li> </ul>

#### Monitoring indicators are provided in the table below.

#### Conclusion

The report outlines the environmental and social issues including consequences associated with pesticides management. The effective implementation of this plan will support the monitoring of pesticide use and related issues among participating farmers, admitted farmers and local communities, and provide for the implementation of an Integrated Pest Management (IPM) in the event that serious pest management issues arise in the project implementation. A total budget of 472,000 USD as indicated in the table below has been earmarked from the AF to support the implementation of the measures outlined in this report

Duuger	Juget estimates			
No.	Activity/Programme	Budget, USD		
1.0	Capacity Building			
1.1	Orientation workshop (on ESMF, PMP, IPM) 12,000			
1.2	Training of district FSD/MoFA/ COCOBOD extension officers in IPM and PMP	12,000 per year		
1.3	Four Training of key NGOs/ Farmer Groups 15,000 per year (quarterly) in the cocoa sector in IPM to support farmers			
1.4	Sub total	120,000 for 4 years		

#### Budget estimates

2.0	Support/Advisory services	
2.1	Pest inventory-baseline data	12,000 per year
2.2	Field guides/ IPM materials by MoFA/ FSD	20,000 per year
2.3	Four Public awareness/ sensitization campaigns	15,000 per year
2.4	Pest/vector surveillance	12,000 per year
2.5	Sub total	236,000 for 4 years
3.0	Project management	
3.1	PMP coordination	8,000 per year
3.2	Monitoring and evaluation	15,000 per year
3.3	Reviews and reporting	6,000 per year
3.4	Sub total	116,000 for 4 years
4.0	GRAND TOTAL/USD	472,000

# 1.0 CHAPTER ONE INTRODUCTION

# 1.1 Project Background and Aims

The development objective of this Additional Financing requested by the Government of Ghana is to improve forest, land and tree management practices by cocoa farmers, CREMA communities and forest reserve managers to reduce forest loss and degradation in selected landscapes in Ghana's High Forest Zone and parts of the transitional zone. It has two main program areas consisting of (1) reclamation of degraded, mined-out areas through community engagement, reforestation and development of economically productive activities; and (2) Plantation development component, which seeks to establish an investment fund and Technical Assistance (TA) program to incentive SMEs; support community-based tree planting & alternate livelihood programs; focus on degraded areas of the HFZ; focus where MLNR and FC already have comparative advantage (advising on how to establish and manage plantations); and learn from experience of Uganda Sawlog Production Grant Scheme (SPGS).

The updated Pest Management Plan (PMP) is based on a review of the FIP safeguard instruments prepared in 2014 which also included an Environmental and Social Management Framework (ESMF) and a Process Framework (PF). The updated PMP have specifically considered the key focus areas of the new program which includes activities to reclaim degraded mined out areas in forests, and, supporting the establishment of community and private sector led tree plantations development in the Ashanti, Eastern and Western Regions of Ghana.

# 1.2 Objectives

The objective of the World Bank safeguard policy on Pest Management (OP 4.09) is to promote the use of biological or environmental control methods and reduce reliance on synthetic chemical pesticides and ensure that health and environmental hazards associated with pesticides are minimized. Pest populations are to be controlled through Integrated Pest Management (IPM) approaches such as biological control, cultural practices, and the development and use of crop varieties that are resistant or tolerant to the pest.

The specific objectives of this PMP are to:

- ensure integration of appropriate pest management techniques into agro-forestry technologies, and cocoa landscapes on farms supported under the project;
- monitor pesticide use and pest issues among participating farmers, admitted farmers and local communities;
- provide for implementation of an Integrated Pest Management (IPM) in the event that serious pest management issues arise, and/or the introduction of sustainable forest management technologies leading to significant increase in the application of pesticides.

### 2.0 CHAPTER TWO PROJECT DESCRIPTION

### 2.1 Overview of project and components

There is evidence of success for many activities including the safeguards being implemented under the original FIP ENFAL, and at mid-term, progress towards the achievement of project development objective (PDO) has been rated as Moderately Satisfactory (MS). However, drivers of deforestation and degradation continue to degrade Ghana's rural landscape. The pace of expansion of illegal ASM in recent years has accelerated forest and agroforest loss in affected areas and the challenges associated with private plantation development persist. The FIP AF is designed to support demonstration pilots that can inform and influence the important steps that can help support to combat deforestation in the cocoa sector and commitments to address illegal mining through scaled up action. The proposed activities are designed to fit into the existing FIP ENFAL implementation structures, demonstration pilot approaches, community engagement efforts, land use planning and management processes, and outreach and communication tools.

The proposed activities are focused on supporting the efforts to address the impacts of illegal ASM on forests, community agroforestry areas and natural landscapes through improved coordination and implementation of policies, testing of mine site clean-up and reclamation approaches, including tree planting and plantation establishment, with community and media engagement, and communication, outreach and training activities, while supporting the government's overall efforts to control illegal ASM for gold, known also as *galamsey*. Specifically, additional financing is supporting two news interventions: (i) supporting the rehabilitation of mined out areas towards reduction of degradation and deforestation due to illegal artisanal small-scale mining (ASM) in forest landscapes, and (ii) the enhancement of private investment in forest plantation development, with community job creation, in forest and cocoa landscapes in Ghana's High Forest Zone (HFZ), which includes areas of Brong-Ahafo, Western, Ashanti and Eastern Regions. The Government's renewed attention to these issues creates new opportunities for FIP to support action needed to accelerate implementation, replicate good practices, and roll out reformed policies on a larger scale.

#### Project Components

The Ghana FIP has four components: 1) Policy Reforms and Institutional Strengthening; 2) Pilot Investments for Improved Forest and Landscape Management with Communities; 3) Innovation, Capacity Building; and Communications; and 4) Project Management, Monitoring and Coordination. The Additional Financing (AF) will follow the same structure.

**Component 1: Policy reforms and institutional strengthening.** Following the structure of FIP ENFAL, this Additional Financing (AF) will expand support for strengthening institutional coordination across a wider array of central, regional and local government agencies. This will particularly include the Minerals Commission (MC) of MLNR and the Ministry of Environment, Science, Technology and Innovation (MESTI), which has a leadership role in the effort to control galamsey, as well as the EPA, which has an important role in setting standards for reclamation activities, controlling water pollution and toxic materials associated with all types of mining. The Ministry of Chieftaincy and Traditional Affairs, local chiefs and traditional authorities, and District Assemblies will need to be more proactively engaged in addressing galamsey issues. The AF will support additional analytical and policy studies that aim to assess the magnitude and geographical spread of ASM impacts on forest and draw lessons from previous and existing activities/strategies-including those of legally

•

operating firms- with regards to rehabilitation and restoration of mined-out sites. Based on this, guidance for practitioners on the ground will be developed, taking a multi-stakeholder approach. Specific policy work is under discussion and could include analysis of existing policies and institutional arrangements to address the environmental footprint of galamsey. Legal analysis and policy development will specifically look at putting in place a policy on mined-out lands; standards and guidance for mine site rehabilitation (based on international good practices); and systems and capacity at national, regional and local level to sustainably protect rehabilitated sites. **Component 2**: Pilot Investments for Improved Forest and Landscape Management with Communities. Field- and community-based investments are the core of the project. These will aim to establish and demonstrate improved forest and landscape management practices, while building the case for wider replication in terms of results. These pilots represent up-front investments required to restore and protect forest cover and reduce deforestation, and thus build on the REDD+ Readiness Process. Pilots will be supported by efforts to consolidate lessons from implementation to improve policy implementation and institutional practices, as well as outreach efforts that encourage replication to landscapes beyond the target corridors. Demonstration activities will be implemented in two main landscapes: on farms and in communities in a specific landscape corridor and on Forest Reserves.

**Component 2a. Pilot demonstration of clean up and reclamation practices with alternative livelihood support after forest and land degradation and loss due to ASM**. This pilot activity aims to reclaim and rehabilitate mined out areas in selected sites as a demonstration of appropriate technical approaches, analysis and testing technologies and policies, and clean up/ reclamation practices. Implementation will be combined with effective engagement of landowners, traditional authorities, mine managers and workers, and community members. Specific activities may include:

- site selection and characterization for clean- up. Mapping, prioritization and characterization of mining degradation in forest reserves and cocoa landscapes in the Ashanti, Western and Eastern Region. This may include site sampling and analysis and assessment of potential clean up approaches and techniques. The AF will support assessments and stakeholder consultations for site selection, for community engagement, and for organizing collective action;
- community engagement in planning, collaboration and training. Engagement with local and traditional authorities and land use planning processes to improve district government collaboration with communities on forest and land protection; Provision of training for communities, including miners, and local governments on responsible management and protection of reclaimed areas;
- community engagement in implementation. Engagement with community and CREMA members in reclamation of selected sites, using appropriate land contouring and replanting approaches. Replanting efforts will consider appropriate crops and materials after analysis of site contamination requirements and the need to avoid uptake in potential food crops. Use of climate-smart agriculture or restoration of cocoa plantations may not be appropriate in some cases;
- alternative livelihood support. Engagement with communities, particularly miners, to identify suitable and beneficial alternative livelihood activities that can complement reclamation efforts, such as nursery stocks for timber and bamboo planting, value added processing and sale of more beneficial natural resource products, equipment rental and operation for land contouring, monitoring and patrols to prevent re-entry into reclaimed sites (see Component 2b);
- private sector engagement for lessons. Engagement with legally operating small- and large-scale mining operations for support, understanding of incentives, lessons on good practices from existing sites, technical assistance and potential visits to demonstration sites;

- guidance on improved practices. Development and roll out of guidance materials on site assessment, clean up / reclamation approaches and success stories and preparation and studies needed in advance of reclamation efforts;
- these efforts will be supplemented with communication and awareness raising activities financed under Component 3. The project design will be further informed by the results of case studies of selected mining sites, development of criteria for the selection of pilot sites [e.g., strength of local institutions including both traditional and District Assembly; ownership and control of the land; representative land use issues; balance of on- and off- reserve sites; proximity of potential partner institutions (training, service delivery)] including lessons from existing mining reclamation experiences, particularly from private sector operations.

The transformative nature of this activity is to provide positive demonstrations of the potential for local community action to clean up and reclaim locally affected sites and waterways following the destructive impacts of ASGM/galamsey. The effort aims to raise awareness among landowners and land users of the beneficial alternative uses of land, the power of collective action, and the ability to control the negative effects of galamsey. These positive demonstrations, if successful, can lead to further GoG support in the follow up of PMIP, as well as potential support from other development partners.

# **Component 2b. Pilot for incentivizing investment and local level job creation in timber plantations.** This pilot activity will provide financing incentives and technical assistance to support tree planting by small- and medium-scale plantation enterprises, including community-based efforts located, to the extent feasible in or nearby to mined-out degraded forest areas in existing FIP and REDD+ target areas, as in Component 2a above. Locating Pilot 2a and 2b nearby to each other in the landscape will help to provide livelihoods support, increase engagement with communities and traditional landowners, and support productive enterprises for the medium term. It is envisaged that plantation developers who access the loan funds will provide employment benefits to nearby community members who will engage in site preparation, tree planting, plantation maintenance and other activities. This could reach up to 3,000 community beneficiaries. Specific activities may include:

Financial assistance for (small and medium) private plantation developers (including nurseries) to expand planted areas, focusing on trees in high demand for specific markets. Firms will be selected based on interest, willingness, business model to promote local employment opportunities (targeting vulnerable groups and forest fringe communities) and to promote quality wood products for domestic markets. Support may include: low cost tree seedlings of economic species; transport and delivery of the seedlings; training, tools and equipment for site preparation, planting/spacing, and care. Low cost loans will also be considered for financially viable firms (based on financial assessment/due diligence and track record. The low-cost loan funds will be held at the Bank of Ghana and will be managed by the Ministry of Lands and Natural Resources and the Forestry Commission. Following the learning of the Uganda Sawlog Production Grant Scheme (SPGS), this activity will provide both technical assistance and financial assistance for small-scale timber plantations companies. Incentive payments will be conditioned on compliance with seed quality and stand maintenance standards. The transformative nature of this activity is to stimulate private sector investment in tree planting which creates employment and supplies local markets. This will reduce pressure on natural forests, create alternative livelihoods at local level, and sequester carbon.

Mobilization of community members (in targeted, degraded, mined-out areas) to engage in planting of economic trees and plants (possibly including indigenous bamboo), that can contribute to short term livelihoods, longer term economic options, landscape restoration and soil/stream bank stabilization. Support may also include local livelihood opportunities, including (carefully selected) crops that can be grown within plantation systems at the early planting stage before the canopy closes. Agricultural production assists with plantation maintenance and weeding and provides an early income source in advance of the first thinning and timber harvest. As above, care must be taken to ensure that crops chosen are safe for human handling or processing when grown in degraded sites. This work will proceed in parallel with reclamation activities mentioned in Component 1, based on assessment, criteria development, and consultations with communities and decentralized government authorities. For communities organized into CREMAs, support may include technical assistance in business planning so that the tree/timber output is eventually used efficiently to contribute to local economic development (processing of timber into sawn wood, poles, building components and other value added/downstream markets). The transformative nature of this activity is to empower communities to engage in local timber production and processing, which will reduce pressure on natural forests, create alternative livelihood options, and at the same time rehabilitate degraded landscapes and sequester carbon.

**Component 2c. Field activity monitoring and technical assistance.** This sub-component will also finance professional monitoring, technical assistance and follow up to ensure that investments and plantation maintenance remain on track during the loan period. This activity is noted separately to indicate the different forms of financing available in this tranche of FIP financing, which includes both grants and concessional finance. Technical assistance activities will focus on advising on tree planting and nurturing techniques, business planning, species selection, mapping and land titling services. In providing the technical assistance, the activity may build on the work of organizations that are currently working in this field, such as the Solidaridad, International Institute for Environment and Development (IIED), Nature Conservation Research Centre (NCRC), the Sustainable Trade Initiative (IDH); certification standards such as UTZ Quality Foods, Forest Stewardship Council (FSC), Rainforest Alliance and Roundtable on Sustainable Palm Oil (RSPO); research institutions and certification bodies.

**Component 3: Innovation, capacity building, and communications.** Following the structure of FIP ENFAL, this AF will expand support for communication, outreach and regular reporting on trends and results of the activity by MLNR to coordination bodies and higher authorities engaged in the MMIP implementation and follow on planning, including MESTI, EPA, MC and others. It will support scaled up communication and outreach activities to engage communities and miners (both legal and illegal) with awareness campaigns about the government's plans and programs. Outreach activities will be designed to engage miners on good environmental practices in artisanal gold mining and mine site rehabilitation, including use of established, legal small-scale mining operations as learning sites and mentors (to the extent possible). Where useful, training programs will be conducted with communities, mine owners and workers, local and traditional authorities and others to introduce improved practices, raise awareness of health impacts, and raise awareness of environmental degradation costs and impacts.

**Component 4: Project management, monitoring, and coordination**. Additional support for management, monitoring and coordination recognizes the need to expand the G-FIP Steering Committee to include key agencies, such as MESTI, EPA, MC, Ministry of Chieftaincy and Traditional Affairs and others as needed. Project management and reporting functions will expand to ensure regular reporting on and integration of the FIP ENFAL- and AF-funded activities are aligned and integrated with larger scale Government programs to address and control the negative effects of illegal ASM in Ghana.

# 2.2 Project stakeholders and benefits

The ultimate project beneficiaries are the rural communities (current and future generations) in the target regions who are currently being affected by the environmental damage and pollution associated with illegal artisanal and small- scale mining (ASM) practices. Community members engaged in ASM, including women, will gain access to greater awareness of risks, as well as new skills and economic opportunities through engagement in rehabilitation activities at inactive mining sites, including opportunities created by tree planting and plantation establishment. Plantation establishment will further help to create jobs for community members, contribute to knowledge sharing and uptake, increase awareness of sustainable forestry management practices, and increase opportunities for promoting positive private sector contributions to the overall REDD+ effort. In the HFZ, the proposed activities will contribute to reducing pressure on high biodiversity areas. Communities, landowners, farmers and cocoa growers will gain through the reduced impact of mining activities on their production systems, as well as improvement of their local environment. MLNR, FC, EPA, and MC, charged with forest, landscape and mining management, will also benefit from clarified policies and guidance, capacity development programs, and outreach and communication programs. Other stakeholders, including the private sector and civil society, will benefit through improved stewardship of land, plus communication and outreach activities.

# 2.3 Summary of Additional Financing Program Activities

The proposed specific program areas under the additional financing are summarized in the listing below:

Reclamation of forest lands degraded through mining

- Mapping and Prioritization of Affected Areas ;
- Mapping and Characterizing Mining Degradation in Cocoa Landscapes;
- Testing of Rehabilitation Approaches and Sequencing of Interventions;
- Productive Species for Rehabilitation;
- Engagement with Local Land Use Planning Processes;
- Leveraging Communication Platforms and Community Engagement.

# Plantation development

- Support to private plantation developers
  - Incentivize private plantation developers to expand planted areas
  - Support may include: Low cost tree seedlings of economic species; transport and delivery of the seedlings; training, tools and equipment for site/ soil preparation, planting / spacing, and care / nurture

- Low cost loans will be considered for financially viable firms (based on financial assessment / due diligence and track record
- Incentive payments are conditional: on compliance with seed quality and stand maintenance/ weeding standards
- TA for skills development in tree planting and nurturing, business planning, species selection, mapping and land titling/clearing services
- Professional monitoring, TA to keep investments on track
- Alternate community livelihood support
  - $\circ$   $\,$  TA and support for cash crops and local food crops grown within plantation systems
  - Intercropping assists with plantation maintenance and weeding
  - Provides early income in advance of the first thinning and timber harvest

### 2.4 Implementing and collaborating institutions

The main responsible ministry is the Ministry of Lands and Natural Resources (MLNR) with the Forestry Commission as the lead implementing agency. The Forestry Commission will work with the Minerals Commission and other partners with skills in communication, community engagement, landscape management practices especially those already engaged with CREMA development. The MLNR is the mother ministry for both the FC and MC. Others are stakeholders in the cocoa landscape supply chain and will include COCOBOD, licensed buying companies, private agents and extension agents and service providers (Solidaridad, NCRC, IUCN etc), research institutions (FORIG and CRIG).

The project will also support the GoG in regular communication and coordination among FIP financed interventions and related activities, to promote synergies among all FIP projects (WB, AfDB, IFC, DGM) as well as information and knowledge sharing among other FIP countries.

# 3.0 CHAPTER THREE REGULATORY AND INSTITUTIONAL FRAMEWORK

# 3.1 Regulatory Framework

# 3.1.1 National

The relevant laws governing environmental pollution, plant protection, and pest and pesticide management and control include:

- Environmental Protection Agency Act, 1994, Act 490;
- Environmental Assessment Regulations, 1999, LI 1652;
- Plants and Fertilizer Act, 2010, Act 803; and
- Water Resources Commission Act, 1996, Act 522.

# Environmental Protection Agency Act, 1994, Act 490

This Act establishes and mandates the EPA to seek and request information on any undertaking that in the opinion of the Agency can have adverse environmental effects and to instruct the proponent to take necessary measures to prevent the adverse impacts. This law aims at controlling the volumes, types, components, wastes effects or other sources of pollution elements or substances that are potentially dangerous for the quality of life, human health and the environment.

Part II of the Act 490 deals with pesticides control and management and this was formally an Act on its own (Pesticides Control and Management Act of 1996, Act 528). This section of Act 490 provides the rules for registration, pesticides classification, approval, clearance, using, disposing of and non-disclosure of confidential information, the granting of licence, labelling, and pesticides inspections (see Annex 1 for details)

# Environmental Assessment Regulations, 1999, LI 1652

The Environmental Assessment Regulations 1999, LI 1652 list activities for which an environmental assessment is mandatory. The Regulations describe the procedures to be followed to obtain permits for both existing and proposed undertakings through the conduct of environmental impact assessments and preparation of environmental management plans. Part 1 Regulation 3 of the LI describes undertaken which requires mandatory environmental impact assessment and Forestry and Mining which relates to this project is mentioned as part of the list.

# Plants and Fertilizer Act 2010, Act 803

The Plants and Fertilizer Act of 2010, combines the Seed Inspection and Certification Decree, NRCD 100 of 1972 and the Prevention & Control of Pests and Diseases of Plants Act of 1965, Act 307. The Act provides for the efficient conduct of plant protection to prevent the introduction and spread of pests and diseases to regulate imports and exports of plants and planting materials; the regulation and monitoring of the exports, imports and commercial transaction in seeds and related matters; and control and regulation of fertilizer trade.

# Water Resources Commission Act, 1996, Act 522

The Water Resources Commission Act 522 (1996) conferred on the Water Resource Commission (WRC) the mandate to regulate and control the use of water resources through granting of water rights a nd water use permits. The Water Use Regulations, (L.I.1692) provides the procedure for allocating permits for various water uses including domestic, commercial, municipal, industrial, agricultural, power generation, water transport, fisheries (aqua culture), and recreational.

# **3.1.2** Some key International Conventions

The International Plant Protection Convention (IPPC) is an international treaty that aims to secure coordinated, effective action to prevent and to control the introduction and spread of pests of plants and plant products. It takes into consideration both direct and indirect damage by pests, so it includes weeds. It also covers vehicles, aircraft and vessels, containers, storage places, soil and other objects or material that can harbour or spread pests.

The International Plant Protection Convention came into force on 3 April 1952. The Convention has been adopted by the Food and Agriculture Organization of the United Nations. Its implementation involves collaboration by National Plant Protection Organizations (NPPOs) — the official services established by governments to discharge the functions specified by the IPPC — and Regional Plant Protection Organizations (RPPOs), which can act as coordinating bodies at a regional level to achieve the objectives of the IPPC.

Ghana's National Plant Protection Organisation is the Plant Protection and Regulatory Services Directorate of MoFA. Ghana adopted the IPPC convention in February 1991.

Other relevant international conventions ratified by Ghana include:

• International Code of Conduct for the distribution and use of FAO pesticides;

#### Objectives of the Code

The objectives of this Code are to establish voluntary standards of conduct for all public and private entities engaged in or associated with the distribution and use of pesticides, particularly where there is inadequate or no national legislation to regulate pesticides.

The Code is designed for use within the context of national legislation as a basis whereby government authorities, pesticide manufacturers, those engaged in trade and any citizens concerned may judge whether their proposed actions and the actions of others constitute acceptable practices.

The Code describes the shared responsibility of many sectors of society to work together so that the benefits to be derived from the necessary and acceptable use of pesticides are achieved without significant adverse effects on human health or the environment. To this end, all references in this Code to a government or governments shall be deemed to apply equally to regional groupings of governments for matters falling within their areas of competence.

The Code addresses the need for a cooperative effort between governments of pesticide exporting and importing countries to promote practices that minimize potential health and environmental risks associated with pesticides, while ensuring their effective use. The entities which are addressed by this Code include international organizations, governments of exporting and importing countries, pesticide industry, application equipment industry, traders, food industry, users, and public-sector organizations such as environmental groups, consumer groups and trade unions. The Code recognizes that training at all appropriate levels is an essential requirement in implementing and observing its provisions. Therefore, governments, pesticide industry, users of pesticides, international organizations, non-governmental organizations (NGOs) and other parties concerned should give high priority to training activities related to each Article of the Code.

• The Basel International Convention on the Transboundary Movement of Hazardous Waste of March 22, 1989;

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was adopted on 22 March 1989 by the Conference of Plenipotentiaries in Basel, Switzerland, in response to a public outcry following the discovery, in the 1980s, in Africa and other parts of the developing world of deposits of toxic wastes imported from abroad. Objective

The overarching objective of the Basel Convention is to protect human health and the environment against the adverse effects of hazardous wastes. Its scope of application covers a

wide range of wastes defined as "hazardous wastes" based on their origin and/or composition and their characteristics, as well as two types of wastes defined as "other wastes" - household waste and incinerator ash.

Aims and provisions

The provisions of the Convention center around the following principal aims:

- the reduction of hazardous waste generation and the promotion of environmentally sound management of hazardous wastes, wherever the place of disposal;
- the restriction of transboundary movements of hazardous wastes except where it is perceived to be in accordance with the principles of environmentally sound management; and
- a regulatory system applying to cases where transboundary movements are permissible.

• The Basel Convention on Persistent Organic Pollutants (POP's);

The Stockholm/Basel Convention on Persistent Organic Pollutants is a global treaty to protect human health and the environment from chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of humans and wildlife, and have harmful impacts on human health or on the environment.

Exposure to Persistent Organic Pollutants (POPs) can lead to serious health effects including certain cancers, birth defects, dysfunctional immune and reproductive systems, greater susceptibility to disease and damages to the central and peripheral nervous systems.

Given their long range transport, no one government acting alone can protect its citizens or its environment from POPs.

In response to this global problem, the Stockholm Convention, which was adopted in 2001 and entered into force in 2004, requires its parties to take measures to eliminate or reduce the release of POPs into the environment.

• International Standards for Phytosanitary Measures (ISPM) FAO;

International Standards for Phytosanitary Measures are prepared by the Secretariat of the International Plant Protection Convention as part of the United Nations Food and Agriculture Organization's global program of policy and technical assistance in plant quarantine. This program makes available to FAO Members and other interested parties these standards, guidelines and recommendations to achieve international harmonization of phytosanitary measures, with the aim to facilitate trade and avoid the use of unjustifiable measures as barriers to trade.

International Standards for Phytosanitary Measures (ISPMs) are adopted by contracting parties to the IPPC through the Commission on Phytosanitary Measures. ISPMs are the standards, guidelines and recommendations recognized as the basis for phytosanitary measures applied by Members of the World Trade Organization under the Agreement on the Application of Sanitary and Phytosanitary Measures. Non-contracting parties to the IPPC are encouraged to observe these standards.

• The Montreal Protocol.

The Montreal Protocol, finalized in 1987, is a global agreement to protect the stratospheric ozone layer by phasing out the production and consumption of ozone-depleting substances (ODS). The stratospheric ozone layer filters out harmful ultraviolet radiation, which is associated with an increased prevalence of skin cancer and cataracts, reduced agricultural productivity, and disruption of marine ecosystems.

The Montreal Protocol has proven to be innovative and successful, and is the first treaty to achieve universal ratification by all countries in the world. Leveraging worldwide participation, the Montreal Protocol has sent clear signals to the global market and placed the ozone layer, which was in peril, on a path to repair. The Montreal Protocol's Scientific Assessment Panel estimates that with implementation of the Montreal Protocol we can expect near complete recovery of the ozone layer by the middle of the 21st century

# 3.2 National institutions responsible for the safe management of agro-chemicals/pesticides

### 3.2.1 Public sector institutions

The key national institutions responsible for the safe management of agro-chemicals and its related matters are presented below:

### **Environmental Protection Agency (EPA)**

The Environmental protection Agency has the mandate to regulate, coordinate and manage the environment. The EPA has the oversight responsibility for pest management and control and it has the following prerogatives:

- the registration of pesticides;
- the limitation or banning of the use of a pesticide if necessary;
- the granting of licences to all categories of pesticides' dealers;
- the levying of penalties.

The EPA and in particular its Chemical Control and Management Centre (CCMC), responsible for pesticides control and management, has offices in all regions as well as three district offices. The Agency periodically provides a list of registered pesticides and banned pesticides for public consumption. The recent list (EPA revised register of pesticides, December 2009) is provided in **Annex 2.** The list is periodically updated and there is the need to liaise with the Agency for any updates during project implementation.

### The Ghana Standards Authority (GSA)

The GSA, formerly Ghana Standards Board, has the full responsibility of ensuring the quality of the infrastructure including the Metrology, Standards, Assessment/Test and Quality control (MSTQ). It ensures that goods and services are of acceptable quality for both local and international consumers. The Authority makes routine analyses of pesticides residues in fruits and vegetables in order to facilitate the exportation of these products and also protect the public health and ensure safety.

The GSA has central facilities in Accra and regional offices in Ho (Volta region), Koforidua (Eastern Region), Takoradi (Western and Central Regions), Kumasi (Ashanti and Brong Ahafo Regions) and Tamale (Northern sector). GSA has been supported by the World Bank funded AgSSIP and UNIDO to bring its MRL analysis capacity up to ISO 17025 requirements.

#### The Customs, Excise and Prevention Service (CEPS)

The CEPS works in close collaboration with the EPA and PPRSD, and reviews the EPA documents, certificates/licences to make sure they concern the importation of approved chemicals, meat and agrochemical products. The importation reports of chemical products are submitted by the CEPS to the EPA on a quarterly basis. The CEPS staff are members to the various technical committees of the EPA including the hazardous waste committee, the pesticide technical Committee and other projects undertaken by the EPA. The CEPS is member of the national coordination team of the Convention of Stockholm on the POPs.

#### Ghana Cocoa Board (COCOBOD)

Ghana Cocoa Board (COCOBOD) is directly under the Ministry of Finance and the functions of COCOBOD centre on the production, research, extension, internal and external marketing and quality control. The functions are classified into two main sectors; pre-harvest and post-harvest. The

pre-harvest sector functions are performed by the Cocoa Research Institute of Ghana (CRIG), the Seed Production Unit (SPU), and the Cocoa Swollen Shoot Virus Disease Control Unit (CSSVDCU).

It is the responsibility of the Cocoa Research Institute of Ghana, to screen all pesticides used in the cocoa industry to ensure that they comply with EU, Japanese and other markets requirements for food safety, Maximum Residual Level (MRL) limits and sanitary and phyto-sanitary standards before they are certified for use on cocoa. The CSSVDCU deals with cocoa swollen shoot viral disease at the farm gate level. It is the responsibility of the Cocoa Extension Services of the COCOBOD to regularly update farmers' skills in the application of pesticides. At the district levels, the CSSVDCU also performs the functions of the cocoa extension services.

The post-harvest sector functions are undertaken by the Quality Control Division (QCD) and the Cocoa Marketing Company (CMC) Limited. The post-harvest activities of COCOBOD start with quality control measures of QCD which farmers must observe to facilitate the acceptance of their produce at the buying centres by the licensed buying companies engaged in internal marketing of cocoa at the time.

### The Ministry of Food and Agriculture (MoFA)-Plant Protection and Regulation Services Directorate

The Ministry of Food and Agriculture is responsible for the regulation of pesticides use in the country. The national plant protection policy is the Integrated Pest Management (IPM) Plan. The Plant Protection and Regulation Services Directorate (PPRSD) of MoFA was established in 1965 by an Act of Parliament: Prevention and Control of Pests and Diseases of Plants Act of 1965, Act 307, which is now replaced by "Plants and Fertilizer Act, 2010 (Act 803).

The PPRSD is the National Institution with mandate and capacity to organize, regulate, implement and coordinate the plant protection services (including pests management and pesticide use) needed for the country in support of sustainable growth and development of agriculture.

The PPRSD has its headquarters in Pokuase near Accra and there are also regional offices in all the ten regions of the country. It also represented at the main entry and exit points throughout the country. It is not directly represented at the district level but however it collaborates with the district MOFA offices to carry out its functions at that level.

The PPRSD is divided into four main Divisions and these include:

- Crop Pests & Disease Management Division;
- Pesticide and Fertilizer Regulatory Division;
- Ghana Seed Inspection Division;
- Plant Quarantine Division.

# Crop Pests & Disease Management Division

The Crop Pests & Disease Management Division (CPDMD) develops Good Agricultural Practices (GAPs), guidelines for Integrated Pest Management (IPM) of food crops. The division also provides information and training on pests and disease situation.

Pesticide and Fertilizer Regulatory Division

The Division supervises and trains Regulatory Inspectors, publishes information materials, registers and trains pesticides and fertilizer dealers and applicators, keeps records as well as statistics of pesticides and fertilizers and manages pesticide and fertilizer stocks in the country. It supervises bioefficacy trials carried out by research.

# Ghana Seed Inspection Division (GSID)

The Ghana Seed Inspection Division (GSID) is responsible for seed certification for seed growers, seed dealers, seed importers/exporters, and also education and awareness creation among farmers on the benefits of utilization of certified seed/planting materials. It relies on the National Seed Testing Laboratory (NSTL), which is under the division, for carrying out seed sampling and laboratory seed quality tests before seeds are certified for distribution and marketing.

# Plant Quarantine Division

The Division works closely with the customs authorities (CEPS) at all the official entry points. It supervises and trains Phytosanitory Inspectors, develops and publishes information material, keeps records of plant imports and exports, the importers and exporters, as well as the pests and diseases of quarantine importance. It issues phytosanitary certificates and import permits according to the IPPC format. It inspects plant materials and makes sure they are free from pests. It also operates the National SPS Enquiry Point.

# Directorate of Crop Services- MoFA

The Directorate is responsible for the following among other things:

- ensuring that there are planting materials (seeds) in adequate quantities at affordable prices and at appropriate times and places ;
- promoting the production of food, industrial and export crops in the country;
- monitoring the development of the crop sub sector and facilitating the capacity building of staff in the districts;
- providing technical advice to the public on all crops within our mandate;
- promoting the sustainable use of soil and water resources for agricultural production;
- recommending issuance of permits and waivers for the importation of agricultural materials for the crops sub-sector/industry.

The Environment, Land and Water Management Unit is directly responsible for environmental management and monitoring issues.

3.2.2 Non-Governmental Organisations/Private Institutions

# Farmers' associations

Private institutions dealing with pest and pesticide issues are mainly involved in crop farming, agroinput trading, and the trade and export of agriculture products. The Ghana Agro-Input Dealers Association (GAIDA) is an apex body for pesticide dealers and distributors in Ghana. Various farmers associations abound but these are weak. The Ghana Federation of Agriculture Producers (GFAP) comprises four major apex farmers associations - the Apex Farmers Organisation of Ghana (APFOG), Farmers Organisation of Ghana (FONG), Peasant Farmers Association of Ghana (PFAG and the Ghana National Association of Farmers and Fishermen (GNAFF) under one umbrella.

Others such as the Vegetable Producers Exporters Association of Ghana (VEPEAG), and the Seed Producers Association of Ghana (SEEDPAG) also exist to take care of members interest. There is the

Ghana Agricultural Associations' Business and Information Centre (GAABIC). These organizations take care of members' interest and to support members to meet the requirements of EPA/PPRSD.

### Cocoa farmers/stakeholders' associations

The major groups of interest include:

- The Ghana Cocoa Coffee and Shea-nut Farmers Association (COCOSHE);
- Cocoa Abrabopa Association (CAA);
- Kuapa Kokoo;
- The Ghana Cocoa Platform.

# The Ghana Cocoa Coffee and Shea-nut Farmers Association

The Ghana Cocoa, coffee and Shea-nut farmers association is the parent body for cocoa, coffee and shea-nut farmers in the country. It was officially founded in 1980 during the reign of Dr Hilla Limann to campaign for better price of the crops.

### Cocoa Abrabopa Association

The not-for-profit Cocoa Abrabopa Association (CAA) was officially established in 2008 after being piloted at Bunso Nkwanta in the Western Region of Ghana two years earlier. It is an association of cocoa farmers seeking a better life by using the CAA input and guidance package. The concept started as farmers program with an input package recommended by the Cocoa Research Institute of Ghana. The associations' headquarters is located at Dunkwa-on-Offin in the Central Region of Ghana, the heart of the cocoa growing regions. Cocoa Abrabopa Association works closely with the Ghana Cocoa Board (COCOBOD).

### <u>Kuapa Kokoo</u>

When internal marketing of cocoa was liberalized in Ghana, a group of farmers led by Nana Frimpong Abrebrese established Kuapa Kokoo as a farmer's cooperative in 1993 with assistance from Twin Limited UK. Two years later, the union received its first Fairtrade certification. The cooperative works at improving the social, economic and political wellbeing of its members. Kuapa Kookoo simply means "Good Cocoa Farming". Kuapa Kokoo seeks to develop itself into a formidable farmer-based organisation capable of mobilising quality cocoa products, improving the livelihood of members and satisfying customers. The head-office is located in Kumasi, Ashanti Region.

### The Ghana Cocoa Platform

The Ghana Cocoa Platform is an avenue created by the Ghana Cocoa Board (COCOBOD) with other supporting stakeholders to provide convening and coordination on technical issues beyond the topic of extension and into other thematic areas of the cocoa sector that would benefit from a public private partnership approach to cocoa development. The goal of the platform is to boost sustainable production in Ghana's cocoa sector through enhanced partnership and cooperation among stakeholders.

The platform, through plenary sessions provides opportunities for a wider inclusion of sector stakeholders to discuss a mirage of issues that will have a positive impact on the Ghanaian cocoa sector. The Platform is to be led by COCOBOD, with UNDP providing technical advice, facilitation and organization support to set up and run the platform.

### 3.3 International Institutions

The key international institution of interest is the World Bank. The World Bank safeguard policy on Pest Management (OP 4.09) has been triggered because of the likely increase in pesticide use to aid food production, which was a concern in the ESMF. The PMP will serve as a management tool for pest and pesticide issues under the project should it become a necessity.

#### World Bank Safeguard Policy OP 4.09: Pest Management

In Bank-financed agricultural operations pest population are normally controlled through Integrated Pest Management (IPM) approaches such as biological control, cultural practices, and the development and use of crop varieties that are resistant or tolerant to the pest. The World Bank can finance the acquisition of pesticides when their use is justified within the framework of an integrated pest management approach and the below mentioned pesticide selection criteria met:

- the purchase of pesticdes on a Bank funded project will be a last resort after all other biological control measures are exhausted;
- the purchase of a pesticide in a World Bank funded project is subject to an evaluation of the nature and degree of the associated risk;
- the pesticide selection and use criteria:
  - a) The selected pesticide would have minimal negative impact on human health.
  - b) To have demonstrated their efficiency when used against target species;
  - c) To have a minimal effect on non-target species and the natural environment ;
  - d) Their use must take into account the need to prevent the development of the ability to develop resistance to pesticides;
- pesticides must be prepared, packed, handled, stored, disposed of and used according to standards acceptable to the World Bank.

- the World Bank does not finance formulated products belonging to the World Health Organisation IA and IB Classes or Classes II formulations:
  - a) When the country has no (regulatory or legal) provisions imposing restrictions to their distribution and use or
  - b) If they might be used by or accessible to the people applying them, agricultural or other workers with no adequate training, equipment and infrastructure for handling, storing and properly applying these products.

### 4.0 CHAPTER FOUR CURRENT SITUATION, PROBLEMS AND ANALYSIS

### 4.1 Some major crops and their pest and diseases

Common pest problems in the project areas include: rodents and migratory and outbreak pests such as birds, locusts and armyworms. IPM strategies are required even though there is no one control practice/measure that can provide acceptable control for any targeted pest. There are various fungi, alga and viruses which affect the cocoa crop. These include the fungus (Phytophthorn spp) that causes pods to rot, go brownish black and the beans are destroyed in the immature pods. The necrosis virus makes the leaves show bands of transparent lesions often with perforated centres. The algae (Cephaleuros mycoidea) causes reddish patches on leaves and twigs and the leaves are shed prematurely. Some common insect pests and diseases in the project areas in the Eastern, Ashanti and Western Regions affecting food crops include Armyworms (Spodoptera exempta) which cause damage by attacking leaves of crops. They cause serious defoliation in upland rice plants, leaving only the stems. They are regarded as occasional pests but when there is outbreak they completely devastate farms. The larger grain borers, midges (Contarinia sorghicola) may suck developing seeds and remove contents. The adults may lay eggs inside flowering heads and small orange larvae that hatch feed on developing seeds. The stem borers (Busseola fusca, Sesamia calamistis, Eldana saccharina) destroy leaves and bore into stems. The same species which attach maize, millet also attach sorghum. The fungus disease caused by Downy mildew (Sclerospora sorghi) dwarfs or reduces upper internodes and results in 'crazy top' phenomenon. Storage mothss (Ephestia cantella, Corcyra cephabonica) are two species of moths that attack soybean seeds in storage. The caterpillars of these moths feed on the grains, causing extensive damage by weaving threads around the grains, reducing their quality. Root-knot nematodes (Meloidogyne spp) are the same nematodes that attack eggplant and okra. They affect roots and develop gall that become malformed inhibiting plant growth; leaves become yellow, then curl and drop off before they mature. Pepper plants attacked by nematodes are also easily infected by wilt diseases and attacked by termites. White flies (Bemisia tabaci) and Aphids (Ahis gossypii) are important as vectors of virus diseases. The same aphids attack cabbage and same white flies attack tomatoes. Fruit fly (Rhagoletis ochraspis) is an important pest of tomato at the fruiting stage. It pierces fruits and leaves rotten spots. The adult fly pierces fruit to lay eggs inside. The small white maggots or larvae develop in the fruit and pupation occurs in the soil below the host plant. The adults and nymphs of variegated grasshopper, Zonocerus variegatus defoliate and sometimes strip the bark of cassava completely. Tuber yield is reduced significantly by defoliation only towards the end of the dry season after natural leaf regeneration has begun. The damaging stages are from three-instar nymph to adults. Defoliation of leaves of up to seven months old cassava can cause 60% reduction in yield but above nine months old cassava, little or no reduction in tuber yield occurs. The yam beetle, Heteroliqus meles and Prionoryctes spp (Coleoptera: Scarabaeidae) can cause serious economic losses by making extensive feeding holes in the yam tubers, often only just before harvest.

Biological and cultural controls of these pests and diseases are undoubtedly of great importance, but neither can respond rapidly to sudden outbreaks of pests, so pesticide use must form key component of integrated pest management. The challenge now is to ensure safe use and correct application so higher yields can be obtained and this PMP provides some guidelines for safe and efficient use of the pesticides.

# 4.2 Common Pests/diseases of cocoa in Ghana

The table below provides the list of common pests and diseases associated with cocoa in Ghana

Disease	Type of Infection (Causal agent)	Symptoms
Black pod	Fungus	Pod rots, go brownish-black. Beans destroyed
	(Phytophthora spp.)	in immature pods. Could result in die-back
Brown root rot	Fungus	Leaves fall prematurely and die-back of twigs
	(Fomes noxius)	occurs. Fungus fruit bodies on root and dead
		trunks. Soil is affected
Cocoa necrosis	Virus	Leaves show bands of transparent lesions
	(Cocoa necrosis virus)	often with perforated centers
Collar crack	Fungus	Longitudinal cracking of trunk from ground
	(Armillaria mellea)	level to about 1.2m upwards, fills with
		cream-coloured mycelium
Collar rot	Fungus	Defoliation and death of plants. White fan-
	(Ustulina zonata)	shaped patches of mycelium are produced
		underneath bark and roots
Cushion gall	Fungus	Excessive production of buds at the nodes
	(Calonectria rigidiuscula)	
Vascular	Fungus	Leaves turn yellow and fall prematurely.
Streak	(Oncobasidium theobroma)	Smaller branches wither starting from the
Die-back		tips
Horse hair	Fungus	Network of black threads which spread
blight	(Marasmius equicrinis)	throughout the canopy, smothers shoots
		growth
Mealy pod	Fungus	Pods turn brown, becomes encrusted with
	(Trachysphaera fructigena)	white to pinkish mealy growth of the fungus
Mistletoe	Flowering Plant	Parasitic flowering plant on host branches.
	(Tapinanthus bangwensis)	Part of branch withers
Pod rot	Fungus	Appears as brown necrotic areas with
	(Botryodiphlodia	concentric rings of black spots. Pods are later
	theobromae)	covered with black sooty powder
Red rust	Alga	Reddish patches on leaves and twigs; leaves
	(Cephaleuros mycoidea)	are shed prematurely
Swollen shoot	Virus	Swelling of chupons and twigs; leaves
	(Cocoa swollen shoot	develop yellow patterns, get crinkled and
	virus)	malformed
White Root	Fungus	Premature defoliation, death of twigs, pods
	(Fomes lignosus)	are small
White thread	Fungus	Leaves are covered and killed in a network of
Blight	(Marasmius scandens)	white mycelial threads

 Table 1:
 Common pests and diseases associated with cocoa in Ghana

Source: Offei et al. (2008)

# 4.3 Common Pests/Diseases of food crops in the project area

Common pests and diseases associated with common food crops in Ghana particularly maize, are summarised in the table below:

No.	Major pests and Diseases	symptoms	
	Pests a	and diseases of maize	
1	<ul> <li>Armyworms (Spodoptera exempta)</li> </ul>	Attack leaves	
2	<ul> <li>Larger grain borers (Prostephanus truncatus)</li> </ul>	✓ Attack stored maize grain	
3	<ul> <li>Greater grain weevil (Sitophilus spp.)</li> </ul>		
4	<ul> <li>Stem borers (Busseola fusca, Sesamia calamistis, Eldana saccharina)</li> </ul>	<ul> <li>Destruction of leaves and boring into stems</li> </ul>	
5	<ul> <li>Maize streak virus (virus transmitted by insects known as leaf hoppers)</li> </ul>	<ul> <li>Can be recognized by the long white streaks on maize leaves, interrupted by yellow and white sections</li> </ul>	
6	• Striga (witchweed) (Striga hermonthica, S. asiatica)	<ul> <li>Is a parasitic weed that grows on the roots of maize and prevents the crop from growing properly</li> </ul>	
	Pests ar	nd diseases of plantain	
1	<ul> <li>the Nematode</li> </ul>	<ul> <li>Nematodes feed on the plant especially on the rooting system and suckers causing considerable damage and yield reduction.</li> </ul>	
2	<ul> <li>Sigatoka or Leaf Spot and Panama disease</li> </ul>	<ul> <li>✓ Sigatoka is a fungal disease caused by cercospora musae</li> </ul>	
	Pests and diseases of cassava		
1	<ul> <li>Cassava Meallybug, Cassava Green Mite, Variegated Grasshopper, White Flies, Grass cutter</li> </ul>	<ul> <li>Cassava pest infestation is very high in the dry season and can cause damage to the leaves and also transmit viral diseases like Cassava Mosaic.</li> </ul>	
2	<ul> <li>Cassava Mosaic, Cassava Bacteria Blight, Cassava Anthracnose, and Cassava Roots Pot.</li> </ul>		

 Table 2:
 Common pests and diseases associated with maize, plantain and cassava in Ghana

# 4.4 Management and Use of Pesticides

Some common challenges with use of Pesticides are listed as follows:

- crops reliance on pesticides;
- lack of access to protective clothing and spray equipment in repair;
- no proper labeling of pesticide products;
- reuse of pesticide containers;
- pre-harvest interval violations;
- unsafe storage, transport and handling;
- application by women and children;
- potential for using pesticides more than necessary;
- use of higher-toxicity products;
- pesticide spraying near homes;

- potential for pesticide poisoning;
- use of pesticides not approved in Ghana;
- poor disposal of used pesticde containers.

Some of these are discussed together with possible mitigation actions in the next section of the report.

4.4.1 Production and importation of pesticides

The finished products are generally imported notably through agents represented at the national or sub regional level. Also, active components may be imported to formulate the products. Such agents in Ghana include the Abuakwa Formulation Unit, Wienco, Dizengoff, CHEMICO, Reiss & Co., Calli Ghana.

Every pesticide produced in Ghana and also imported is subjected to formal permitting by the regulatory agency, the EPA. This constitutes a primary barrier filtering product that enter the country. In order to ensure that it is done efficiently, Phytosanitary Controls are stationed at the borders (sea ports, airports, and roads) which are manned by the PPRSD of the MOFA and are assisted by Custom officials at the entry points.

The control of pesticides is also done in principle at the distribution level in the small towns/villages through decentralized services offered by MOFA, who see to it that distributors, dealers and resellers abide by the established procedures through the issuance of sales permits.

# 4.4.2 Organisation and practices followed in sale and distribution of pesticides

The distribution channels are mostly privately run. The main suppliers feed the market through distributors who in turn serve the retail traders. Some distribution shops – sales point- are well managed and the products are displayed on shelves in accordance with standard practice. However, at most retailing shops in small towns and villages, their practices are usually sub- standard because of inadequate official monitoring and enforcement.

On account of the low financial capacity of peasant farmers and other buyers, the pesticide products are mostly sold in very small volumes and are therefore usually poured into smaller containers. This practice is carried out with little caution notably during decanting of products. Small time retailers may decant products into smaller containers to meet farmers' purchasing ability. These smaller containers are without the proper labels describing active ingredients and concentration, dosage, handling instructions and hazards, batch and date of expiry.

Some retailers are polyvalent and therefore engage in other types of commerce in the same premises. Distribution is also carried out sometimes without authorisation as required by regulation and with shop attendants not having received any form of training or knowledge on the pesticide products. Indeed, many of these 'middlemen' do not have the requisite approvals/permits/license. On the other hand, retailers properly affiliated to recognised suppliers receive training provided by the suppliers themselves.

4.4.3 Abuses in pesticide supply and sales

The abuses associated with the supply and sale of pesticides include:

• use of banned and or unregistered pesticides, see Annex 2;

- decanting of pesticides into improper containers without appropriate labels;
- supply and sale by unauthorized persons /persons who do not have EPA/PPRSD license and permits; and
- supply and sale of adulterated and or expired pesticides.

The adulteration of pesticides by some dealers is a source of concern to the Environmental Protection Agency (EPA), Ministry of Food and Agriculture (MoFA) and the general public. Farmers have complained about adulterated and fake pesticide products including alteration of expiry dates, and the preparation and sale of products in already used pesticide containers. Some dealers exploit the low level of literacy of the peasant farmer who cannot tell the difference between fake and genuine products and because of poverty is inclined towards buying the cheap but fake product.

# 4.4.4 Use of pesticides by farmers:

In most cases, farmers apply the pesticides by spraying, on their farms. Unfortunately, there is very little personal protection such as hand gloves, overalls, timing of application, wind direction at application, etc for these farmers and they are therefore at great health risk without the appropriate personal protective equipment (PPEs). The time of spraying during the day also compounds the risk. Farmers have been observed spraying during hot afternoons when sun is at its peak and such farmers who are usually not in appropriate PPEs are more exposed to contamination through inhalation and skin contacts.

In some situations, the treatment is done too often beyond recommended periods which leads to product wastage, risks to consumers of farm products and inefficiency. The documentation to allow official monitoring and provide product traceability is very scarce and, in some cases, nonexistent. There is concern about the presence of residues in products with its attendant risks to public health.

# 4.4.5 Management of empty pesticide containers

The disposal of empty pesticide containers rests mostly with resellers and farmers because of the inefficient retail sales network. They are not equipped for this responsibility and usually resort to different disposal means, including farmers/buyers reusing empty containers for drinking water storage purposes, open burning of used containers and sometimes indiscriminate dumping on farms and water courses.

There is currently no workable arrangement for the collection, treatment and disposal of empty containers in the country. An earlier collaborative effort between PPRSD-MOFA/ COCOBOD and EPA and some private sector entities has achieved little success.

# 4.4.6 Accidents resulting from pesticide use

The Ghana Poison Control Centre keeps records on pesticide poisoning and accidents. The existence of the Centre is not very popular among many Ghanaians. Currently, the data on pesticide poisoning and accidents seems to be fragmented and still remains mostly as news items by various newspapers that have reported such cases, and also various hospital records. There is the need to create awareness that will target the different pesticide users in order to avoid accidents and incidents.

# 4.5 General health problems and environmental hazards associated with pesticides

There are acute and chronic health effects and these effects may manifest as local or systemic effects. They include skin irritations, such as itching, rashes, blisters, burns, wounds, irritation of throat leading to cough or difficulty in breathing with or without wheezing or choking, chest pain, burning mouth and throat with pain on swallowing, runny nose, sore throat, head ache, dizziness, sudden collapse with or without unconsciousness. The table below provides a summary of pesticide problems relating to human health, environment and crops.

### Pesticide problems relating to health, environment and crops

# Hazards to health

- Acute poisoning: 3 million poisonings including 20,000 unintentional deaths occur annually (WHO).
- Symptoms of acute poisoning include severe headaches, nausea, depression vomiting, diarrhoea, eye irritation, severe fatigue and skin rashes.
- Chronic ill-health problems can affect women and men, girls and boys exposed to pesticides, whether because of their occupation or because they live near areas of use. Such problems can include neurological disorders, cancers, infertility and birth defects and other reproductive disorders.

### Hazards to Environment

- Contamination of drinking water and ground water ;
- Water contamination kills fish ;
- Soil contamination .
- Wildlife and domestic animals can be killed by spray drift or drinking contaminated water.
- Exposure may also cause infertility and behavioural disruption ;
- Persistence in the environment and accumulation in the food chain leads to diverse environmental impacts ;
- Loss of biodiversity in natural and agricultural environments.

#### Hazards to crops

- Pesticide resistance: 520 species of insects and mites, 150 plant diseases; and 113 weeds are resistant to pesticides (FAO). Resistance can create treadmill syndrome, as farmers use increasing inputs to little effect, while elimination of beneficial insects causes secondary pest outbreaks.
- High cost of pesticides can lead to falling incomes for farmers: Newer products are often safer but are more expensive. Farming communities lose knowledge of good horticultural practices and become dependent on expensive external inputs.

# 5.0 CHAPTER FIVE PEST MANAGEMENT ACTION PLAN

The management plan prepared and implemented under the project is still relevant and will be followed under the Additional Financing. However, monitoring activities will be strengthened and documentation improved to provide adequate record of implementation successes and challenges.

# 5.1 Institutional Responsibility for this PMP

The responsibility for implementing the PMP rests with the MLNR/ FC. However, a close collaboration is required with the EPA and MoFA (PPRSD) to successfully implement the Plan. Their respective regional and district offices must have the capacity and resources to perform their duties satisfactorily including COCOBOD and all relevant farmer-based organisations or groups. All site-specific activities requiring pesticide use and management under this Additional Financing will be identified early by the District FSDs and included in a pest management planning process to be developed in close association with the district MOFA officers and other stakeholders. The regional FSD will compile a database of all key persons in pesticide management from the relevant district and regional MoFA, COCOBOD, and farmer groups which will be shared among all stakeholders.

# 5.2 Actions, Methods and Measures

# Pest Inventory

The project through the district FSDs will continue to collaborate with MoFA, COCOBOD, farmers groups to identify any types, abundance and location of pest plants and animals by conducting regular seasonal interviews and surveys among farmers, and relevant district level institutions as well as CBOs/community-based farmer organisations.

# Prevention of new Pest Infestation

The PMP will endeavour to treat and manage any new pest infestations as soon as they are identified.

*Early Detection and Eradication:* A process for the reporting and identification of unusual plants and animals as already set up by the MOFA will be followed. Local and admitted farmers will be required to report unusual plants, animals and pests to the district FSD, MoFA or COCOBOD extension officers or to the nearest farmer group or association. The district FSD will also collaborate with the district MoFA and COCOBOD extension officers to carry out periodic (seasonal) interviews with farmers on new or strange plants/pests/animals damaging their crops to detect new infestations. A rapid response process for the management of new infestations will be available through the MOFA and the district FSD.

*Prevention of Spread:* The PMP will follow laid down MOFA protocols for appropriately managing risks of all human assisted transport of declared pests.

# Management of established pests

The PMP will ensure that established pest infestations are effectively managed by following protocols developed by MOFA. Priorities for pest management will be regularly reviewed. These will include the reduction of Class 3 pests (environmental weeds) where appropriate. Regional FSDs through MoFA will be required to properly document the current methods in managing established pests, so that such information can be made available to beneficiary farmers to follow and adopt.

# General Action Plan to ensure safe use of Pesticides

The safer use of pesticides involves several issues that should be addressed in a collaborative manner.

No.	Issue		Management Action					
1.	•	Avoid crops (varieties) that create reliance on pesticides:	<ul> <li>Obtain planting materials of crops varieties that have been proven, through local field trials, to demonstrate acceptable levels of resistance or tolerance to major pests and diseases from CSIR- Crops Research Institute or similar other MoFA agricultural centres. The District</li> </ul>					
2.	•	Assure access to protective clothing and spray equipment in repair:	<ul> <li>The project through District FSD safeguard officers (see ESMF) and the District MoFA officers will provide strict supervision of the use and maintenance of protective clothing which must be changed and washed regularly. Spray equipment must be regularly checked and serviced by qualified spray equipment mechanic who should undertake routine equipment maintenance on a clearly defined work programme. Furthermore, spray operators should be provided practical training on how to recognize faults in spray delivery and equipment performance so that they can make early complaint of any signs of equipment malfunction.</li> </ul>					
3.	•	Assure proper labelling of pesticide products:	Since most of the pesticides used in Ghana are imported as formulated products, District FSD will work closely with MoFA staff to ensure that the labels on containers of pesticides used in their respective districts are appropriate and contain all the information as required by the Pesticide Registration and Control scheme. They will continue to engage farmers and train them on the safe storage and use of the chemicals.					
4.	•	Prevent reuse of pesticide containers:	✓ A major source of pesticide poisoning is careless disposal of used pesticide containers which are often collected and re-used for storing drinking water, fuel and cooking oils. The project at the national level may consider teaming up with the NGO, Croplife Ghana and also in collaboration with the EPA to ensure safe management of empty pesticide containers. The district FSD will maintain regular programme of public awareness, education and training of all categories of farm workers on the risks associated with reuse of pesticide containers.					
5.	•	Pre-harvest interval violations:	✓ District FSD will continue to work with farmers to ensure that content in the safe and effective use of pesticides trainings/sensitizations always includes adequate attention to pre-harvest intervals between the last pesticide application and harvest. Strict compliance with this interval, which will vary with crops and pesticide would minimize the risk of unacceptable high level of pesticide residues in harvested products. This is particularly important for crops such as vegetables.					

 Table 3:
 Some management actions for safe use of pesticides

6.	<ul> <li>Unsafe storage, transport and handling:</li> </ul>	✓ The FC will work with the EPA to ensure that extreme care is taken in the transportation, storage and handling of pesticides. Pesticides should be transported in well-sealed containers and isolated from other materials in the vehicles. Regional EPA and FSD will carry out random checks and outcome adequately documented. The District FSD will work with farmers to ensure provision of special pesticide stores in- farm. Entry into and handling of the products should be restricted to only a few persons who have received adequate training in the proper management of pesticides stores and products handling. All spray operators should also be trained in the proper handling of pesticides.
7.	<ul> <li>Application by women and children:</li> </ul>	✓ Women, especially pregnant and nursing mothers, as well as children represent a highly vulnerable group for pesticides poisoning. It is often observed that women apply pesticides either with the child at their back or leave them under shade of trees in the farm and later breast feed them without first washing and changing their clothes thus increasing the chance of contaminating the children in the process. The project should support District FSD together with MoFA to train pesticide inspectors to monitor and ensure that such practices does not occur The EPA should be involved in the training of women in the application of pesticides to avoid the incidence described above.
8.	<ul> <li>Potential for using pesticides more than necessary:</li> </ul>	✓ A basic principle of integrated pest management is judicious use of pesticides in the context of IPM. This means that the use of chemical pesticides must only be as a last resort, for example, in the case of unexpected pest invasion by migratory pests such as armyworms and grasshoppers or grain eating birds. Pesticides must also only be used when it is economic to do so on a needs basis.
9.	<ul> <li>Use lower- toxicity products:</li> </ul>	✓ The WHO hazard classification of pesticides as well as the list of products approved by the EPA based on WHO hazard classification, should be used as the guide for the choice of pesticides for use in crop protection. As much as possible, farmers should be prevented from choosing class 1a and 1b pesticides (list attached as annex 3) and trained to use pesticides only within class 111. If pesticides in class 11 must be used, every effort must be made to ensure that adequate safety precautions are taken on safe use of products and the protection of applicators.
10.	<ul> <li>Discourage pesticide spraying near homes:</li> </ul>	The surroundings of homes should always be avoided when spraying pesticides, except in vector control programmes when it is necessary to undertake indoor spraying with pesticides on walls of homes, and under very strict supervision and monitoring by officials from the Ministry of Health.
11.	<ul> <li>Avoid products and spray</li> </ul>	<ul> <li>In addition to avoiding spraying around domestic homes, every precaution must be taken to minimize spraying</li> </ul>

locations that might contaminate ground and surface water:	near standing water bodies or streams or pouring pesticides on the ground around homes, near wells and playing grounds. In particular, spray operators should be trained on the risks associated with: (a) pouring excess pesticide mixtures in rivers, streams or ponds; (b) washing pesticide application equipment in rivers, streams, ponds and other water bodies; and (c) discarding empty pesticide containers in rivers, streams and ponds.
--	---

# 5.2.1 Mitigating insects and pest damage to plantation

Under the private plantation development intervention to be implemented, insects and pest damage to trees could be a serious problem in plantation development especially where the intensive forest farming system is practiced. This could be experienced at the early stage of development which involves nursery establishment. The most common insects which cause severe damage to plantations are defoliators and stem borers. Defoliator insects cause severe defoliation and, hence, reduce growth rate. Stem borers cause severe damage; in young plantations (1-5 years old) damaged trees may die back or top break causing a reduction in growth rate and stem quality. Pest and insects cause severe damage to the standing trees and reduces the value of timber, and therefore, could require application of both chemical and biological agents. This is however not a serious challenge for the project because, teak and cedar species which are the recommended for plantation development are resistant to current defoliators and stem borers. If they become a challenge in the course of implementation, silvicultural treatments such as weeding, control burning, thinning, and intercropping would be followed. These methods can reduce the insect populations and improve both the growth rate and quality.

# 5.2.2 Mitigating impact at the mined-out areas

Under the intervention on the rehabilitation of degraded mined-out areas, it is anticipated that there would not be need for pest management. However, should the need arise as a result of rehabilitation and restoration of mined out areas with plantation development, the pest management measures explained above would be followed in addressing and mitigating insect and pest damage to plantation development

# 5.3 Training and Capacity Building for this PMP

# IPM Capacity Building

The AF of the FIP will continue to collaborate with MoFA to provide basic training in Integrated Pest Management (IPM) and Good Agricultural Practices (GAP) to beneficiary local farmers within the project areas and key NGOs also providing support to cocoa farmers in the area. As much as possible, existing channels within the MOFA for pest management will be utilised and therefore no new platforms will need to be created. The MoFA extension officers will be supported by the district FSDs to educate farmers/key NGOs in the cocoa sector on common pests and diseases associated with the food crops grown in the area such as maize, cassava, plantain and vegetables and how to control and manage such pests/diseases through and IPM and GAP approaches to minimise the use of pesticides.

The purpose of the capacity building of beneficiary farmers in particular is to encourage farmers to develop their IPM approaches to the management of pests and diseases under the FIP Project. Key NGOs in the cocoa sector trained in IPM will also transfer their knowledge to farmers for improved food crop/production. The success of IPM depends largely on developing and sustaining institutional

and human capacity to facilitate informed decision making by farmers and local communities and empowering them to integrate scientific and traditional knowledge to solve location-specific problems and respond to market opportunities.

The AF of the FIP will continue to collaborate with the local government institutions such as the district assembly and the district/regional MoFA as part of the IPM capacity building to train farmers/key NGOs in adoption of ecologically sound and environmentally friendly management practices especially among smallholder farmers in the forest reserves, agro-forestry corridors and cocoa landscape on farms in the three regions. The farmers will learn cultural, biological and ecological processes underpinning IPM options, and use the newly acquired knowledge to choose compatible methods to reduce losses in production and post-harvest storage.

# Education, Awareness Creation and Communication

The AF FIP will continue to create awareness among farmers, admitted settlements and local communities around selected forest reserves in the Ashanti, Eastern and Western Regions on the importance of pest management.

Availability of Information: The AF FIP will ensure that all farmers benefiting from the projects have access to information regarding declared pest plants. The regional and district FSDs will be responsible.

*Education and Training:* there will be training of district FSD/MoFA/ COCOBOD extension officers in IPM and PM. FSD will incorporate pest management awareness into all environmental training programs. There will also be basic training and capacity building for other stakeholders particularly smallholder farmers on in Integrated Pest Management (IPM) and Good Agricultural Practices (GAP) including ecologically sound and environmentally friendly management practices among farmers, including safe use, handling and disposal of pesticides.

*Communication:* The Regional FSD in collaboration with MoFA will communicate the content of the Pest Management Plan with the relevant agencies at the district assemblies/local government institutions, district MoFA and COCOBOD pest management representatives. The district FSD will inform farmer groups or individuals of its pest management policies, practices and achievements.

# 5.4 Monitoring and Evaluation

The district FSD will liaise with the respective district MOFA for regular monitoring and evaluation of control programs to determine the level of progress being made in controlling the spread of any declared plant pests and the reduction of infested areas. The following monitoring indicators will be incorporated into a participatory monitoring and evaluation plan. So far, the level of success has not been high but with the current emphasis on the appointment and empowerment of District FSD safeguard officers and their training, better prospects are expected.

	-				
No	Area			Indicat	ors
1.0	•	Training	and	✓	Category and number of extension agents and farmers
		awareness	5		educated or trained on pests and pesticide issues;

# Table 4: Monitoring Indicators

	creation	<ul> <li>✓ practicals skills/techniques most frequently demanded by extension agents and farmers;</li> <li>✓ crop /livestock management practices preferred by farmers.</li> </ul>
2.0	<ul> <li>Technology acceptance/ field application</li> </ul>	<ul> <li>✓ category and number of farmers who correctly apply the skills they had learnt;</li> <li>✓ new management practices adopted most by farmers;</li> <li>✓ types of farmer-innovations implemented;</li> <li>✓ level of pest damage and losses;</li> <li>✓ rate of adoption of IPM practices;</li> <li>✓ impact of the adoption of IPM on production performance of farmers.</li> </ul>
3.0	<ul> <li>Project direct benefits</li> </ul>	<ul> <li>✓ Increase in crop/livestock production; increase in farm revenue;</li> <li>✓ social benefits: e.g., improvement in the health status of farmers;</li> <li>✓ levelof reduction of pesticide purchase and use.</li> </ul>

# 5.5 Reporting and Review Arrangement

Periodic report on the progress of pest management within the selected forest reserves, agroforestry corridors, and cocoa landscapes on farms will be prepared by district FSD safeguard officers, and it will form part of the environmental and social reporting framework for the FIP projects. The PMP information will include: common pests identified or declared in the project areas, common pesticides used by farmers, sources of pesticides used by farmers, level of success of treatment of pests under the project, the amount and type of herbicide used, IPM knowledge and practices among farmers, etc. District FSDs will be responsible for their respective district reports.

# 6.0 IMPLEMENTATION BUDGET

An annual estimated budget of USD472,000 is required to implement the PMP in four (4) years, and this is provided in the table below.

Table 5:	buuget estimates			
No.	Activity/Programme	Budget, USD		
1.0	Capacity Building			
1.1	Orientation workshop (on ESMF, PMP, IPM)	12,000		
1.2	Training of district FSD/MoFA/ COCOBOD	12,000 per year		
	extension officers in IPM and PMP			
1.3	Four Training of key NGOs/ Farmer Groups	15,000 per year		
	(quarterly) in the cocoa sector in IPM to support			
	farmers			
1.4	Sub total	120,000 for 4 years		
2.0	Support/Advisory services			
2.1	Pest inventory-baseline data	12,000 per year		
2.2	Field guides/ IPM materials by MoFA/ FSD	20,000 per year		
2.3	Four Public awareness/ sensitization campaigns	15,000 per year		
2.4	Pest/vector surveillance	12,000 per year		
2.5	Sub total	236,000 for 4 years		
3.0	Project management			
3.1	PMP coordination	8,000 per year		
3.2	Monitoring and evaluation	15,000 per year		
3.3	Reviews and reporting	6,000 per year		
3.4	Sub total	116,000 for 4 years		
4.0	GRAND TOTAL/USD	472,000		

Table 5: Budget estimates

### 7.0 CONCLUSION

The report outlines the environmental and social issues including consequences associated with pesticides management. The effective implementation of this plan will support the monitoring of pesticide use and related issues among participating farmers, admitted farmers and local communities, and provide for the implementation of an Integrated Pest Management (IPM) in the event that serious pest management issues arise in the project implementation. A total budget of 472,000 USD has been earmarked from the AF to support the implementation of the measures outlined in this report

#### BIBLIOGRAPHY

EPA (2010). Final Report-Environmental Analysis and Management Plan (EAMP) for the Sustainable Land and Water Management Project. Prepared by SAL Consult Ltd, May 2010

Integrated Pest Management Extension Guide 2 Integrated Pest Management Practices for the Production of Cereals and Pulses, MOFA/PPRSD-Ghana with German Development Cooperation (GTZ) by Anthony Youdeowei

MoFA (2011). Draft Final Report-Ghana Commercial Agriculture Project Pest Management Plan. Prepared by SAL Consult Ltd, November 2011

Offei, S.K.; Cornelius, E.W.; Sakyi-Dawson, O. (2008): Crop Diseases in Ghana and their Management, Sponsored by TALIF for College of Agriculture, University of Ghana, Legon, Accra, Smartline Ltd, ISBN 9988600275

#### ANNEX 1: Environmental Protection Agency Act, 1994, Act 490

# Environmental Protection Agency Act, 1994 ACT 490 PART TWO

# **Pesticides Control and Management Registration of Pesticides**

#### SECTION

- 28. Registration.
- 29. Application for registration.
- 30. Classification of pesticides.
- 31. Approval.
- 32. Provisional clearance.
- 33. Duration of provisional clearance.
- 34. Refusal to register pesticide.
- 35. Duration of registration and renewal of registration.
- 36. Non-disclosure of confidential information.
- 37. Power of Agency to amend, ban or suspend
- pesticides. 38. Register of pesticides.
- 39. Gazette publication.
  - Pesticides Dealers
- 40. Licence to deal in pesticides.
- 41. Exemptions.
- 42. Application for dealers licence.
- 43. Issue bf dealer's licence.
- 44. Safeguards for use of pesticides.
- 45. Suspension, cancellation of licence.
- 46. Appeals.
- 47. General regulatory power.
- 48. Conformity to registered pesticides.
- 49. Advertising of registered pesticides.
- 50. Containers and packaging of pesticides.
- 51. Records and reporting.
- 52. Exercise of function by the Board.
- 53. The Pesticides Technical Committee. Enforcement
- 54. Powers of inspectors.
- 55. Analysis and certificate.
- 56. Obstruction of inspectors.
- 57. Other offences and penalties.
- 58. Sale of pesticides.
- 59. Offences by body of persons.
- 60. Forfeiture.
  - Miscellaneous
- 61. Customs officer.
- 62. Regulations.

(4) A person shall not be convicted of an offence by virtue of subsection (3) if it is established that the offence was committed without that person's knowledge or connivance and that due care and diligence was exercised to prevent the commission of the offence having regard to the circumstances.

#### Registration of Pesticides

#### 28. Registration

(1) A person shall not import, export, manufacture, distribute, advertise, sell or use a pesticide unless the pesticide has been registered by the Agency in accordance with this Act.

(2) Despite subsection (1), the Agency may authorise the importation of an unregistered pesticide

(a) if the pesticide is

(i) meant for experimental or research purposes and not for distribution, or

(ii) for use in the event of national emergency, or

(iii) in direct transit through the Republic and the Board is satisfied that the pesticide is permitted to enter the country of destination, or

(b)' if the Minister by legislative instrument so prescribes.

(3) The Agency may authorize the manufacture of an unregistered pesticide for export if

(a) the pesticide would be manufactured in accordance with specifications provided by the importer, and

(b) the specifications satisfy the requirements applicable for the purpose in the country to which it is to be exported.

(4) In determining whether or not to approve the registration of a pesticide and the classification of a registered pesticide, the Board shall consider

(a) the characteristics of the pesticide formulation, such as the acute dermal, oral or inhalation toxicity;

(b) the persistence, mobility and susceptibility to biological concentration of the pesticide;

(c) the experience gained from the use of the pesticide, such as the likelihood of its misuse and any good safety record which is contrary to available laboratory toxicological information;

(d) the relative hazards of its patterns of use, such as granular soil applications, ultralow volume or dust aerial applications or air blast sprayer applications;

(e) the extent of the intended use;

(f) the supporting data and any other technical information that the Agency may request from the applicant or from a public institution; and

(g) any other matter relevant to the control or management of pesticides.

#### **29.** Application for registration

(1) A person may apply to the Agency for the registration of a pesticide.

(2) The application shall be in the prescribed form, and shall be supported by the prescribed fee, information, samples and any other material determined by the Agency.

#### **30.** Classification of pesticides

(1) The Agency shall, for the purposes of registration, classify a pesticide as being

(a) for general use if, having regard to section 28 (3), it considers that the pesticide when applied for the use for which it is registered will not have an unreasonable adverse effect on the environment;

(b) for restricted use or suspended use if it considers that its use in accordance with widespread commonly recognised practice in the absence of additional regulatory restrictions may cause unreasonable adverse effect on people, animals, crops or on the environment; or

(c) a banned pesticide.

(2) Pesticides classified under subsection (1) as restricted, suspended or banned are subject to the prior informed consent procedure defined in section 63.

#### **31.** Approval

The Agency may approve a pesticide subject to the prescribed conditions and may only register a pesticide if it is satisfied

(a) that the pesticide is safe and effective for the use for which it is intended, and

(b) that the pesticide has been tested for efficacy and safety under local conditions.

#### **32.** Provisional clearance

(1) Where in respect of an application for registration of a pesticide, the Agency is satisfied(a)that most of the information required for its registration has been provided to the Agency, and

(b) that the pesticide does not present a toxicological risk to people, animals, crops or the environment, it may provisionally clear the pesticide for use without the registration, which shall be

temporary pending the registration of the pesticide.

(2) A provisional clearance is subject to the conditions specified in writing by the Agency.

(3) The Agency shall cancel a provisional clearance if the application for the registration of the pesticide is refused.

#### **33. Duration of provisional clearance**

(1) A provisional clearance for a pesticide is valid for a period not exceeding one year as determined by the Board.

(2) The Agency may require

(a) the submission of an information, and

(b) the analysis of a sample,

which appears to the Agency to be necessary to determine whether and under what conditions a provisional clearance shall be granted.

#### 34. Refusal to register pesticide

On refusing to register a pesticide the Agency shall, within fourteen days of the decision, inform the applicant in writing of the refusal, and the grounds for the refusal.

#### 35. Duration of registration and renewal of registration

(1) A pesticide registration remains valid for a period not exceeding three years from the date of registration.

(2) The Agency may, where it is satisfied that a registered pesticide remains safe and effective for use in the Republic, renew the registration for further periods of three years at a time.

(3) The renewal of a pesticide registration is subject to

(a) the submission of the information, analysis or samples which the Agency may require, and

(b) any other conditions determined by the Agency.

#### **36.** Non-disclosure of confidential information

Information furnished by an applicant in respect of the registration of a pesticide or its renewal which is agreed to by the Agency and the applicant as confidential shall not be disclosed by the Agency unless authorised by law.

#### **37.** Power of Agency to amend, ban or suspend pesticides

The Agency, if satisfied that a registered pesticide under the existing conditions of its registration or provisional clearance

(a) is not effective, or

(b) may cause hazard to people, animals, crops or the environment, may by publication in the Gazette amend the classification, suspend or ban the pesticide or cancel the registration or provisional clearance at any time after the registration or during the period of a provisional clearance.

#### **38.** Register of pesticides

(1) The Agency shall maintain a register of pesticides in which the Agency shall re cord the names and particulars of registered and provisionally cleared pesticides.

(2) The contents of the register of pesticides shall be reviewed periodically by the Agency.

#### 39. Gazette publication

The Agency shall publish annually in the Gazette

- (a) registered pesticides and their classification,
- (b) provisionally cleared pesticides,
- (c) suspended or banned pesticides, and
- (d) amendments made to the classification of pesticides.

#### Pesticides Dealers

#### **40.** Licence to deal in pesticides

(1) A person shall not import, export, manufacture, distribute, advertise or sell a pesticide except in accordance with a licence issued under this Act.

(2) A licence issued under this Act is subject to the conditions specified in writing by the Agency.

#### 41. Exemptions

The Agency may, by legislative instrument, exempt from the requirement of a licence under section 40 a pesticide specified in the instrument.

#### 42. Application for dealers licence

An application to import, export, manufacture, distribute, advertise or sell a pesticide shall be made to the Agency in the prescribed form supported by the prescribed fee and information required by the Agency.

#### 43. Issue of dealer's licence

The Agency may issue a licence authorising the applicant to import, export, manufacture, distribute, advertise or sell pesticides if it has reasonable grounds to believe that the applicant will comply with the conditions required under the licence.

#### 44. Safeguards for use of pesticides

(1) A person shall not use or require an employee to use a pesticide in a manner that is inconsistent with this Act or the Regulations.

(2) A person concerned with the use of a pesticide shall inform any other person who uses a pesticide of the dangers involved in the misuse of pesticides.

(3) Where the Regulations require that a pesticide shall be applied by or under the supervision of a person authorised in that behalf by the Agency, a person shall not apply that pesticide unless authorised or

supervised.

(4) A person shall not require or permit an employee to handle or use a pesticide in the course of employment without providing and requiring the employee to use the protective facilities and clothing which will permit safe handling of the pesticide.

(5) Where protective facilities and clothing are required as a condition for a licence, an employer whose employees use or handle pesticides to which the licence relates shall provide and require the use of the facilities and clothing.

(6) A person shall not harvest or offer for sale a foodstuff on which pesticides have been used except in compliance with the prescribed practices including the interval between the application of pesticides and the harvest.

### 45. Suspension, cancellation of licence

The Agency may suspend or cancel a licence

(a) if it has reasonable grounds to believe that the licensee had failed or refused to comply with this Act, the Regulations or any other conditions for the licence, or

(b) if it considers that the cancellation or suspension appears necessary to'prevent or remove a hazard to human beings, crops, animals or the environment.

#### 46. Appeals

(1) A licensee aggrieved by a suspension or cancellation of the licence may appeal to the Minister.

(2) The Minister shall determine the matter within thirty days after the receipt of a written notification of the grievance.

(3) A licensee may appeal to the High Court if aggrieved

(a) by the failure of the Minister to determine the matter within the thirty days, or

(b) by the decision of the Minister.

#### 47. General regulatory power

The Agency may restrict or prohibit the use of a registered pesticide in designated areas during specified periods of time.

#### 48. Conformity to registered pesticides

(1) A person shall not alter a pesticide so as to change its formulation, composition or usage or alter it in any other manner.

(2) A person shall not sell a registered or provisionally cleared pesticide or an unregistered pesticide imported under section 28 (2) (b) if because of

(a) a fault in manufacture,

(b) a deterioration, or

(c) an accident or any other cause,

the pesticide fails to meet the conditions of the registration or of the provisional clearance or the conditions of the authorisation.

#### **49.** Advertising of registered pesticides

A person shall not advertise a registered or provisionally cleared pesticide in a manner which

(a) is false,

(b) is misleading or inconsistent with the information supplied to the Agency at the time of the application, or

(c) omits warnings prescribed by the Agency.

#### **50.** Containers and packaging of pesticides

(1) The Agency may prescribe the containers, labels and the manner for packaging of pesticides at the wholesale and the retail levels.

(2) Where a container, label or packaging is prescribed by the Agency for a registered pesticide, a person shall not

(a) manufacture, import, export, distribute, advertise or sell a registered pesticide otherwise than in a package or container prescribed for the pesticide, or

(b) alter the label of a pesticide so as to misrepresent the nature of the pesticide.

#### **51. Records and reporting**

A person who imports, exports, manufactures, distributes or sells a pesticide shall make a record of the quantities of pesticides imported, exported, manufactured, distributed or sold by that person and the record shall be

(a) maintained for ten years from the time it is made, and

(b) made available to the Agency at its request at the time and in the manner required by the Agency.

#### **52.** Exercise of function by the Board

(1) The functions conferred on the Agency under this Act shall be exercised by the Board.

(2) The Board may delegate any of its functions under this Act to a committee of the

Board, a member of the Board or to any other person.

### 53. The Pesticides Technical Committee

(1) There is hereby established as a committee of the Board the Pesticides Technical Committee consisting of

(a) the chairman appointed by the Board,

(b) the Head of the Chemistry Department of the National Nuclear Research

Institute of the Ghana Atomic Energy Commission,

(c) one representative who has expertise in pesticides from the Cocoa Services Division of the Ghana Cocoa Board not below the rank of an executive

director,

(d) the director of the Plant Protection and Regulatory Services of the Ministry of Food and Agriculture,

(e) the director of the Veterinary Services Department of the Ministry of Food and Agriculture,

(f) one representative from the Ministry of Health,

(g) one representative of the Ghana Standards Board not below the rank of a senior scientific officer,

(h) one representative from the laboratory of the Customs, Excise and Preventive Service not below the rank of principal collector,

(i) one representative from the Association of Ghana Industries,

(j) one representative of the Ghana National Association of Farmers and Fishermen,

(k) one representative from the Ministry responsible for Lands and Forestry,

(I) one representative from the Agency not below the rank of a senior

programme officer who shall be the secretary to the Committee, and

(m) one representative of the Ministry responsible for the environment.

(2) The Committee shall perform the functions assigned to it by the Board.

(3) The quorum for a meeting of the Committee is seven members.

(4) The Committee shall regulate its own procedure.

#### Enforcement

#### **54.** Power of inspectors

(1) A member of the relevant sub-committee of a District Assembly so authorised or an inspector appointed under section 15 may

(a) inspect an equipment used or to be used in applying pesticides;

(b) inspect the storage or disposal facilities or areas used for the storage or disposal of pesticides;

(c) inspect land actually, or reported to be, exposed to pesticides;

(d) investigate complaints of injury to human beings and animals, or damage to land and pollution of water bodies resulting from the use of pesticides;

(e) take samples of pesticides applied or to be applied;

(f) monitor the sale and use of pesticides;

(g) examine and take copies of a licence or any other documents required by this Act or the Regulations.

(2) An inspector who has reasonable cause to believe that an offence has been committed under this Act or against the Regulations may, without warrant,

(a) enter and search premises, other than premises used exclusively as a place of residence, in which the inspector believes on reasonable grounds that the offence has been committed or that a pesticide which has been illegally used is being stored;

(b) stop and search a vehicle which the inspector believes is being used in the commission of the offence;

(c) seize the equipment, pesticide or appliance which the inspector believes on reasonable grounds is being used in the commission of the offence;

(d) arrest a person who the inspector believes on reasonable grounds has committed the offence.

(3) The inspector shall give a written receipt where reasonably practicable, for an article or a thing seized pursuant to subsection (1), and the reasons for the seizure shall be stated in the receipt.

(4) A person arrested under subsection (1) shall be taken before a Court within forty-eight hours.

(5) An inspector shall produce evidence of authority before the inspector enters and searches any premises and in any other case produce it on request.

#### 55. Analysis and certificate

(1) A sample of a pesticide taken for the purpose of analysis shall be submitted to and analysed by an analyst appointed by the Agency.

(2) In proceedings under this Act, the production of a certificate signed by an analyst appointed by the Agency is prima facie evidence of the facts stated in the certificate.

#### **56.** Obstruction of inspectors

A person who

(a) obstructs an inspector in the exercise of a power conferred under this Act or the Regulations, or

(b) fails to comply with a lawful enquiry or requirement made by an inspector in accordance with section 54, an offence and is liable on conviction to a fine not exceeding two hundred penalty units or to a term of imprisonment not exceeding six months or to both the fine and the imprisonment.

#### **57.** Other offences and penalties

(1) A person who,

(a) except as provided in section 28 (2) or otherwise exempted, imports, exports, manufactures, distributes, advertisers, sells or uses a pesticide which has not been registered,

(b) contrary to section 40 (1), imports, exports, manufactures, distributes, advertises or sells a pesticide without a licence, or

c) uses a pesticide or requires an employee to use a pesticide contrary to a provision in section 44, or

(d) alters a pesticide so as to change its formulation, composition or usage in a manner contrary to section 48 (1), or

(e) sells contrary to section 48 (2), a registered or provisionally cleared pesticide which by reason of a fault of manufacture, deterioration, accident or any other reason fails to meet the conditions required by this

Act, or

(f) contravenes a requirement provided under section 50 (2) for the presentation of pesticides, commits an offence and is liable on conviction to a fine not exceeding five hundred penalty units or to a term of imprisonment to not exceeding two years or to both the fine and the imprisonment, and in the case of a continuing offence, to an additional fine not exceeding twenty-five penalty units in of each day during which the offence continues.

(2) A person who contrary to section 49,

(a) advertises a pesticide in a manner which is false, misleading or inconsistent with the information supplied to the Agency at the time of registration, or

(b) includes on the label or accompanying instructions of a pesticide misleading or fictitious claim,

commits an offence and is liable on conviction to a fine not exceeding two hundred and fifty penalty units or to a term of imprisonment not exceeding one year, and in the case of a continuing offence to an additional fine not exceeding ten penalty units in respect of each day during which the offence continues.

(3) A person who

(a) fails or refuses to maintain or submit the contents of records to be maintained, or

(b) deliberately or negligently makes a false record, or

c) submits a false or a misleading statement,

commits an offence and is liable on conviction to a fine not exceeding two hundred penalty units or to a term of imprisonment not exceeding twelve months, and in the case of a continuing offence, to an additional fine not exceeding ten penalty units in respect of each day during which the offence continues.

(4) A person who discloses, otherwise than as provided by this Act, a proprietary formation acquired by that person in the performance of a function under this Act commits an offence and is liable on conviction to a fine not exceeding two hundred penalty units or to a term of imprisonment not exceeding twelve months or to both the fine and the imprisonment.

#### 58. Sale of pesticides

It is not a defence for a person charged with the sale of a pesticide contrary to section 28 to plead

(a) that at the time of the sale there was a reasonable belief that the pesticide was registered or did not differ in any way from the purported contents of the container, or

(b) that the pesticide otherwise did not fail to meet the requirements of this Act.

#### 59. Offences by body of persons

(1) Where a body of persons is convicted of an offence under this Act,

(a) in the case of a body corporate, other than a partnership, every director orofficer of that body shall be deemed to have committed that offence;

(b) in the case of a partnership, every partner or officer of that body shall be deemed to have committed that offence.

(2) A person shall not be convicted of an offence by virtue of subsection (1) if that person proves

(a) lack of knowledge or connivance in the commission of the offence, and (b) the exercise of due care and diligence to prevent the commission of the

offence having regard to the circumstances.

### 60. Forfeiture

Where a person is convicted of an offence under this Act or the Regulations, the Court may, in addition to any other penalty imposed, order that the equipment, pesticide or appliance used in the commission of the offence shall be forfeited to the Republic and that a licence issued under this Act shall be suspended for the period directed by the Court or be cancelled.

Miscellaneous

#### **61.** Customs officer

(1) A customs officer

(a) shall assist in the enforcement of this Act, and

(b) shall prevent the importation of a pesticide where the importation is contrary to this Act.

(2) The Agency shall provide the Commissioner of Customs, Excise and Preventive Service with a list of licensed importers and a list of registered and banned pesticides.

(3) The Commissioner shall keep records of imported pesticides and shall, at the regular periods directed by the Agency, submit copies to the Agency.

#### 62. Regulations

(1) The Minister may, on the advice of the Board, by legislative instrument, make Regulations for

(a) standards and code of practice relating to the protection, development and rehabilitation of the environment;

(b) the category of undertakings, enterprises, constructions or developments in respect of which environmental impact assessment or environmental management plan is required by the Agency;

(c) the type, quantity, conditions or concentration of substances that may be released into the environment;

(d) the manufacture, importation, use, collection, storage, recycling, recovery or disposal of substances which may be hazardous to the environment;

(e) the disposal of waste generally;

(f) the protection of any particular species of fauna and flora;

(g) matters in respect of which fees are payable and the amount payable;

(h) matters for which permits are required under this Act; and

(i) generally, for giving effect to this Act.

(2) Despite section 9 of the Statutory Instruments Act, 1959 (No. 52), Regulations made under this section may impose a penalty not exceeding two hundred and fifty pen alty units or a term of imprisonment not exceeding one year or to both the fine and the imprisonment, and in the case of a continuing offence an additional penalty not exceeding ten penalty units in respect of each day during which the offence is continued.

(3) The Minister may, on the advice of the Board and in consultation with Minister responsible for Food and Agriculture, by legislative instrument, make Regulations prescribing matters relating to

(a) the manufacture, importation, exportation, distribution and sale of pesticides;

(b) the reporting of significant pesticide accidents or incidents to a designated person or office and the procedure for the reporting;

(c) the procedure for the storage, transportation and disposal of a pesticide or pesticide container which is considered likely to cause injury to human beings, vegetables, crops, livestock, wildlife or beneficial insects or which is likely to pollute the environment;

(d) the form and contents of pesticide labels;

(e) the method of packaging of registered pesticides;

(j) pesticide containers and their disposal;

(g) the advertising of pesticides;

(h) the purpose for, and the manner in which the pesticide may be used;

(i) the licensing of premises where pesticides are used or dealt in;

(j) the practices, including pre-harvest intervals, for the harvest of crops and the slaughter and milking of animals following exposure to pesticides;

(k) the application of pesticides that are to be made under the supervision of an authorised person and the provision for the authorisations;

(I) the analyses of pesticides;

(m) the facilities and clothing to be used or worn while handling pesticides;

(n) the disposal of pesticides;

(0) the records to be maintained by persons importing, manufacturing, formulating, distributing or selling pesticides;

(P) the aerial application of pesticides;

(q) pesticide applicators;

(r) the exemption of the importation of certain specified categories and quantities of pesticides from the requirement of a licence;

(s) the prescription of fees in respect of the registration of pesticides and the licensing of dealers by the Board; and

(t) generally, for giving effect to this Act.

(4) The Regulations may prescribe in relation to a contravention of a provision in it, penalties not exceeding a fine of two hundred and fifty penalty units or a term of imprisonment not exceeding one year or both the fine and the imprisonment, and for additional penalties not exceeding ten penalty units for each day in respect of a continuing offence.

#### **63. Interpretation**

In this Act, unless the context otherwise requires,

"advertising" means the promotion of the sale and use of pesticides by print or electronic media, signs, displays, gifts, demonstration or word of mouth;

"Agency" means the Environmental Protection Agency established under

section 1;

"banned pesticide" means a pesticide for which registered use has been prohibited by the Agency or for which registration has not been granted by the Agency for health or environmental reasons;

"Board" means the governing body provided for under section 4 (1);

"chairman" means the chairman of the Board;

"Committee" means the Pesticides Technical Committee provided for under section 53;

"Court" means court of competent jurisdiction;

"dealer" means a person who imports, exports, manufacturers, distributes, advertises or sells pesticide;

"defoliant" means a substance or mixture of substances which when applied to a plant causes the leaves or foliage to drop from the plant with or without abscission;

"desiccant" means a substance or a mixture of substances which when applied to a plant, accelerates the drying of the tissue of the plant;

"distribute" means to supply commercially, to transport, store or sell;

"District Assembly" includes a Municipal and a Metropolitan Assembly;

"formulation" means the combination of various ingredients designed to render the product useful and effective for the purpose claimed, or the form of pesticide as purchased by users;

"functions" includes powers and duties;

"Fund" means the National Environmental Fund established under section 16;

"inspector" includes a person appointed under section 15 by the Board and a

member of the relevant sub-committee of a District Assembly authorised under section 54;

"label" includes a writing, printing or an illustration made on, attached to, included in, belonging to or accompanying a pesticide or its container;

"manufacture" in relation to a pesticide means

(a) to prepare, compound, make the active or other ingredients,

(b) to add substances, mix, formulate, package or re-package, label or other wise treat the active ingredient with a view to its sale,

but does not include the carrying on of a bona fide research or experiment relating to a pesticide or the doing of an act or a thing that forms part of or is incidental to that research or experiment;

"member" means a member of the Board;

"Minister" means the Minister responsible for the Environment;

"person responsible" includes, in relation to an undertaking, enterprise, a construction or development, a person at whose order or on whose behalf the undertaking, enterprise, construction or development is being done or will be done;

"pest" means an insect, a rodent, bird, fish, mollusk nematode, fungus, weed, microorganism, virus or any other kind of plant or animal life that is injurious to human or animal health, crops, stored produce, processed foods, wood, cloths, fabrics or any other inanimate objects;

"pesticide" means

(a) a substance or mixture of substances intended for preventing, destroying, repelling or reducing the destructive effects of a pest, or

(b) a substance or mixture of substances intended for use as a plant regulator, defoliant, desiccant or wood preservative;

"plant regulator" means a substance or mixture of substances which, when applied to ornamental or crop plants or to their produce, causes, through physiological action, the acceleration or retardation of the rate of growth or otherwise alters the behaviour of those plants or their produce, but does not include substances intended for use as plant nutrients, trace elements, nutritional chemicals, plant inoculants or soil

amelioration;

"premises" includes a building, land, ship, an aircraft, a caravan, other than a building or place used exclusively as a dwelling house;

"prescribed" means prescribed by the Regulations;

"prior informed consent procedure" means the international operation procedure for exchanging, receiving and handling notification information by the Agency on restricted, suspended and banned pesticides for reasons of health and the environment;

"regional capital" means the administrative capital of the Region;

"Regulations" means the Regulations made under this Act;

"sell" includes to offer for sale and to provide pesticide as part of a service of pest control although the pesticide is described as free or included in the service;

"unreasonable adverse effect on the environment" means an effect which is injurious to human, animal or plant life or which renders the environment unsafe for human, animal or plant life.

#### 64. Repeals and vesting

(1) The Environmental Protection Agency Act, 1994 (Act 490) and the Pesticides Control and Management Act, 1996 (Act 528) are repealed.

 $\sim$ 2) Despite the repeal under subsection (1),

(a) an instrument, a permit or an order issued under any of the repealed enactments and in force at the commencement of this Act shall continue in force until altered or revoked under this Act;

(b) the members of the Board established under section 4 of the Environmental Protection Agency Act, 1994 (Act 490) shall continue in office until the expiration of the term of officers specified under section 5 of that Act.

(3) The rights, assets, properties, obligations, liabilities held for or on behalf of the dissolved Environmental Protection Agency and the persons employed for or by that Agency are by this section transferred to the Agency established under this Act.

#### **65. Transitional provisions**

After six months from the coming into force of this Act, pesticides shall be registered in compliance with this Act and licences for dealing in pesticides shall be issued in com pliance with this Act.

### Annex 2: List of banned and permitted pesticides in Ghana

Environmental Protection Agency, Accra, Revised Register of Pesticides as at December 2009 under the Part II of the Environmental Protection Agency Act, 1994 (Act 490).

### (A) FULLY REGISTERED PESTICIDES (FRE)

vo.	Trade Name	Registration No. / Date of Issue	Concentration of Active Ingredient	Hazard Class	Crops/Uses	Company	
1.	Abute 500E FRE/0908/00250G March 2009		Temephos (500g/l)	nı	Larvicide for control of mosquitoes and guinea worm	Dizengolf (Unana) Limited, Acora	
2.	Acteon Super 25 EC	FRE/0843/00228G November 2008	Pirimiphos methyl (250g/l)	u	Insecticide for the control of insect pests in storod produce such as cereals, cowpra and soybean.	Kumurk Trading Enterprise "Kumuni	
3.	Actellic Super Dust FRE/0906/00239G January 2009		Pirimiphos methyl (16g/kg) + Permethrin (3g/kg)	ш	Insecticide for the control of insect pests in stored produce such as cowpea, soybean and maive	Calli Ghuna Company Limited, Tema	
4	Akate Suto 30 FRE/0908/00249G		Diazinon (500g/l)	н	Insecticide for the control of capsida on coexit	Dizengoff (Ghana) Limited, Accta	
5.	Bayer Advance Home Pest Control	FRE/0751/00140G	Cyflathrin (0.1%)	11	Insecticide for Public Health purposes.	Mezart Global Technologies, Accra	
6.	Betallic Super	FRE/0825/00224G November 2008	Picimiphos methyl (400gf) + Permethrin(75g7)	п	Insecticide for the control of insect pests in stored produce such as maize and cowpea	Bentronic Productions, Kurnasi	
7	Bossmalle 2.5 EC	FRE/0935/00231G January, 2009	Lambda- cyhalothrin (25g7)	n	Insecticide for the control of linsect pests in vegetables, cowpea & soybean	K. Bada Agrochemicals "Kumani	
L	Callidan FRE0506/00154G 400EC March 2008		Dimethoate (400g/l)	п	Insecticide for the control of mealybugs, mites, thrips, greenflies and borer larsue in vegetables, pineapples and ornamentals	Calli Ghuna Company Limitod, Terna	
92	Cocoprid 20 SL	FRE/0805/00172G April 2008	Acetamiprid (20g/0	11	Insecticide for the control of caupid bags in cocos	Chemico Limited, Term	
10.	Confidor 20051.	FRE/0701/00122G	Imidacloprid (200g/l)	ш	Insecticide for the control of cocoa pests	Wience Limited Accra	
11.	Consider 200 SL	FRE/0823/00171G	Imidacloprid (200g/I)	ш.	insecticide for the control of insect pests on segrables	Thomhoof Enterprise, Kumasi	

	12.	Cymethoate Super EC	FRE/0805/00206G November 2008	Dimethoate (400g/l) + C)permethrin (36g/l)	H	Insecticide for the control of aphids, caterpillars, whitefly, grasshoppers, bollworms in vegetables and conton	Chemico Lämited, Tema
	13.	Cypudem 43.6% EC	FRE/0857/00216G November 2008	Cypermethrin (36g/D + Dimethoate (400g/I)	u	Insocticide for the control of insect pests of vegetables and field crops	Sunshine (Ghana) Agric Products & Trading Co.Acera
	14.	Cypercal SOEC	FRE/0706/00125G	Cypermethrin (50g/l)	н	Insecticide for the control of pests in cotton	Calli Ghana Company Limited, Tema
	15.	Cypertex 10 EC	FRE/0824/00212G November 2008	Cypermeihrin (10%)	111	Insecticide for the control of pests in cotton and venetables	Saro AgroSciences, Aecra
	16.	Cypex Maxi Smoke Generator	FRE/0902/00259 G March 2009	Cypermethrin (13.5% w/w) + Potassium Chlorate(20% w/w)	н	Insecticide smoke generator for general indoor disinfection	Agrimat Limited, Madina, Acera
	17.	Decis 25 EC	FRE/6858/00180G	Deltamethrin (25.5g/L)	II	Insecticide for the control of insect pests of vegetables	Golden Stork Ghara Limited, Tema
	18.	Depesch Plate	FREU0701/00126R	Magnesium phosphide (56%)	16	Insecticide for the control of pests in stored grain.	Wienco Limited, Accra
	19.	Delete 2.5 SC	FRE/0752/00117G February 2007	Deltamethrin (2.5%)	m	Insecticide for public health purposes	Newlife Medical Centre, Tamale
	20.	Detia Gas Ex- B	FRE/0701/00127R	Aluminium phosphide (57%)	Ib	Insecticide for the control of pests in stored grain.	Wienco Limited, Accra
	21.	Diazol 50 EW	FRE/0708/00121G March 2007	Diazinon (500g/l)	ш	Insecticide for the control of pests in vegetables	Dizengoff (Ghara) Limited, Acces
	22.	Dice 2.5 EC	FRE/0956/00257G March 2009	Deltamethrin (2.5%)	н	Insecticide for control of residual insect pests of dry cocoa beans and other residual insects	Sidalco Limited, Spintex, Accra
	23.	Dizen-combi SC	FRE/0708/00412G August 2007	Fenvalerate (10%) + Fenithrothios (20%)	m	Insecticide for the control of insect pests in stored produce	Dizengoff (Gharu) Limited, Accra
	24.	Diz-Lambda 2.5 EC	FRE/0908/00252 March 2009	Lambda Cyhalothrin(25g/L)	ш	Insecticide for control of pests in vegetables and flowers	Dizengoff Ghana Limited, Accra
1	25	Durshan 4 E	FRE/0805/00200G	Chlorpyrifos	п	Insecticide for the	Chemico

Is ovarhion [ISO]	18854-04-8	3018	OP	L	I	3	112	Adjusted classification (see note 3)
Lead arsenate [C]	7784-40-9	1617	AS	s	L	2	c10	EHC 18, 224; IARC 84; ICSC 911; JMPR 1969
Mecarbam [ISO]	2595-54-2	3018	OP	Oil	I	2	36	JMPR 1987a
Mercuric oxide [ISO]	21908-53-2	1641	HG	s	0	2	18	ICSC 981; CICAD 50. See note 2
Methamidophos [ISO]	10265-92-6	2783	OP	s	I	2	30	HSG 79; ICSC 176; JMPR 1991, 2003b; See no
Methidathion [ISO]	950-37-8	3018	OP	L	I	2	25	JMPR 1998b; ICSC 1659
Methiocarb [ISO]	2032-65-7	2757	с	s	I	2	20	JMPR 1999
Methomyl [ISO]	16752-77-5	2757	с	s	I	2	17	DS 55, EHC 178; HSG 97; ICSC 177, JMPR 19
Monocrotophos [ISO]	6923-22-4	2783	OP	s	I	2	14	See note 2; HSG 80; ICSC 181; JMPR 1996b
Nicotine [ISO]	54-11-5	1654		L		1	D50	ICSC 519
Omethoate [ISO]	1113-02-6	3018	OP	L	I	2	50	JMPR 1997a
Oxamy1 [ISO]	23135-22-0	2757	с	s	I	2	6	DS 54; JMPR 1986b, 2003b
Oxydemeton-methyl [ISO]	301-12-2	3018	OP	L	I	3	65	JMPR 1990, 2003b; Adjusted classification (see
Paris green [C]	12002-03-8	1585	AS	s	L	2	22	Copper-arsenic complex
Pentachlorophenol [ISO]	87-86-5	3155		s	ĻF,H	2	D80	See note 2; Irritant to skin; EHC 71; HSG 19; J

Coumphos [ISO]	56-72-4	2783	OP	s	AC,MT	2	7.1	ICSC 422, JMPR 1991
Countetraly1 [ISO]	5836-29-3	3027	co	s	R	2	16	
Cyflathrin [ISO]	68359-37-5		PY	5	I	2	c15	JMPR 2008; See note 9, p. 8
Beta-cyflathrin [ISO]	68359-37-5		PY	5	I	2	c 11	JMPR 2008; See note 9, p. 8
Zeta-cypermethrin [ISO]	52315-07-8	3352	PY	L	1	3	c86	See note 9, p. 8; HSG 22; ICSC 246; JMPR 20 classification (see note 3)
Demeton-S-methyl [ISO]	919-86-8	3018	OP	L	1	2	40	DS 61, EHC 197;1CSC 705; JMPR 1990
Dichlarvos[ISO]	62-73-7	3018	OP	L	1	3	56	Volatile, DS 2; EHC 79; HSG 18; IARC 20, 53 1994; Adjusted classification (see note 3)
Dicrotophos [ISO]	141-66-2	3018	OP	L	1	2	22	ICSC 872
Dinoterb [ISO]	1420-07-1	2779	NP	s	н	2	25	