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World Bank

WEST AFRICA AGRICULTURAL PRODUCTIVITY PROGRAMME

(PPAAO/WAAPP 1-C)

(Guinea, Benin, Liberia, Sierra Leone, Togo)

Pests and Pesticides Management Plan (PPMP)

FINAL REPORT

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ABBREVIATIONS

ABE	Environmental Agency of Benin / Béninoise pour l'Environnement
ANGE	National Environment Management Agency / Agence Nationale de Gestion de l'Environnement
ANPROCA	National Agency for Rural Development and Agricultural Consultancy/Agence Nationale de Promotion Rurale et de Conseil Agricole
BSD	Office for Strategy and Development / Bureau de Stratégie et de Développement
CAADP / PDDAA	Comprehensive African Agricultural Development Plan / Programme Détaillé de Développement de l'Agriculture africaine
CARI	Central Agricultural Research Institute
ECOWAS /CEDEAO	Economic Community of West African States / Communauté économique des Etats de l'Afrique de l'Ouest
CRD	Rural Development Communities / Communautés rurales de développement
CGES	Environmental and Social Management Framework / Cadre de gestion environnementale et sociale
CORAF / WECARD	Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles / West and Central African Council for Research and Development
CSLP	Strategic Framework for Poverty Alleviation / Cadre stratégique de lutte contre la pauvreté /
DAGRI	Department of Agriculture / Direction de l'Agriculture
DICAF	Department of Agricultural Extension and Operational Training / Direction du Conseil Agricole et de la Formation Opérationnelle
DSRP / PRSP	Poverty Reduction Strategy Paper / Document de Stratégie de Réduction de la Pauvreté
EPA	Environment Protection Agency
EIE / EIA	Environmental Impact Assessment / Etude d'Impact sur l'environnement
EE / EA	Environmental Assessment / Evaluation environnementale
FAO	Food and Agriculture Organization
FSNS	Food Security and Nutrition Strategy
GDP	Gross domestic product
GIPD/ IPPM	Integrated Pest and Pesticides Management / Gestion Intégrée des Pesticides et Déprédateurs
GIVM	Integrated Management of Disease Carriers / Gestion Intégrée des Vecteurs de maladies
IPDM	Integrated Pest and Disease Management

ICAT	Technical Advice and Support Institute / Institut de conseil et d'appui technique
ITRA	Agricultural Research Institute of Togo / Institut togolais de recherche agronomique
INRAB	National Agricultural Research Institute of Benin / Institut National de Recherches Agricoles du Bénin
IRAG	Agricultural Research Institute of Guinea / Institut de Recherches Agronomiques de Guinée
IITA	International Institute for Tropical Agriculture
ILRI	International Livestock Research Institute
IRD / RDI	Research and Development Institute / Institut de Recherche pour le Développement
IDA	International Development Association / Association Internationale pour le Développement
LPDA	Policy Letter for Agricultural Development/ Lettre de Politique de Développement Agricole
LPDE	Policy Letter for Livestock Development / Lettre de Politique de Développement de l'Elevage
LMR	Maximum Residue Level / Limite Maximale de Résidus
LAV	Anti-Vector Control / Lutte Anti-vectorielle
LIV	Integrated Vector Control / Lutte Intégrée Vectorielle
MA	Ministry of Agriculture / Ministère de l'Agriculture
MEPN	Ministry of the Environment and Nature Conservation / Ministère de l'Environnement et de la Protection de la Nature
MAEP	Ministry of Agriculture, Livestock and Fisheries / Ministère de l'Agriculture de l'Elevage et de la Pêche
MOA	Ministry of Agriculture (Liberia)
MAFFS	Ministry of Agriculture Forestry and Food Security
MERF	Ministry of the Environment and Forest Resources / Ministère de l'Environnement et des Ressources Forestières
NGO / ONG	Non Governmental Organization / Organisations Non gouvernementale
NSADP	National Sustainable Agriculture Development Plan
OP / PO	Producers' Organisations / Organisations de Producteurs
OCB	Community Grassroots Organisation / Organisation communautaire de base
PFE	Focal Point for the Environment / Point Focal Environnement
PGPP	Pest and Pesticide Management Plan / Plan de gestion des pestes et pesticides
PSRSA	Strategic Plan for the Rehabilitation of the Agricultural Sector / Plan Stratégique pour la Relance du Secteur Agricole
PNIA	National Agricultural Investment Programme / Programme National d'Investissement Agricole
PNIASA	National Agricultural and Food Security Investment Programme / Programme national d'investissement agricole et de sécurité alimentaire
PNGE	National Environmental Management Programme / Programme National de Gestion de l'Environnement

PNADE	National Programme for Decentralised Activities and
Environmental	Management / Programme National d'Actions
Décentralisées de	gestion de l'Environnement
PUASA	Emergency Support Programme for Food Security / Programme d'Urgence d'Appui à la Sécurité Alimentaire
PPAAO / WAAPP	West Africa Agricultural Productivity Program / Programme de Productivité Agricole en Afrique de l'Ouest
PAN/LCD	National Action Plan for Desertification Control / Plan d'Action National de Lutte contre la Désertification
PGES	Environmental and Social Management Plan / Plan de gestion environnementale et sociale
PGPP/ PPMP	Pest and Pesticide Management Plan / Plan de gestion des
Pestes et	des pesticides
PV / PP	Plant Protection / Protection des Végétaux
ROPPA	Network of Peasant Farmers' and Agricultural Producers' Organisation of West Africa / Réseau des Organisations
Paysannes et	des Producteurs Agricoles de l'Afrique de l'Ouest
SNRA / NARS	National Agricultural Research Systems / Système
National de	Recherche Agronomique
SNSA / NFSS	National Food Security Strategy / Stratégie Nationale de
Sécurité	Alimentaire
SNDPI	National Strategy for the Development of Small-scale
Irrigation /	Stratégie Nationale de Développement de la Petite
Irrigation	
SRPA	Agricultural Production Rehabilitation Strategy / Stratégie de
relance	de la production agricole
SPVCP	Plant Protection and Plant Quarantine Service / Service de la Protection des Végétaux et du Contrôle Phytosanitaire
SLARI	Sierra Leone Agricultural Research Institute
SIDA / AIDS	Acquired Immunodeficiency Syndrome / Syndrome d'immunodéficience acquise
UEMOA	West African Economic and Monetary Union / Union
Economique et	Monétaire Ouest Africaine
VIH / HIV	Human Immunodeficiency Virus / Virus
d'Immunodéficience	Humaine

Executive Summary

The World Bank has an objective of contributing toward agricultural productivity and competitiveness through four (4) components: Regional cooperation in technology generation and dissemination; Centres of Excellence; Technology generation; Coordination, Management, Monitoring and Evaluation. The present study of WAAPP IC covers the following countries: Benin, Republic of Guinea, Liberia, Sierra Leone and Togo.

WAAPP will finance agricultural research and technology dissemination whose implementation can impact the environment negatively. In fact, the results of agricultural research will bring benefits to the local populations and, if adequate measures are not taken beforehand, they could also, in certain cases generate negative effects at the environmental and social levels. The activities of WAAPP 1C can lead to the use of phytosanitary and anti-vector control products. The challenge will therefore be to combine the development of agricultural research and extension activities and the requirements of protection as well as environmental and social management.

In case of phytosanitary products, it is necessary to control the potential negative effects connected with the use of these products. Frequently, there is the lack of information and sensitization of the producers on the different alternatives of pest control which cause a high dependence on chemical products in certain plants. The government structures have not adequately considered the risks for human health and the environment in their measures and development strategies for the sector.

Also, within the framework of the implementation of the activities of WAAPP1C, the Pests Pesticides Management Plan (PPMP) has been designed to minimize the potential negative effects on human and animal health as well as the environment which could result particularly from the use of Pesticides, and to promote the integrated pest and pesticide management. The present plan falls in line with the existing or ongoing initiatives in the target countries.

At the legislative and regulatory level, many documents have been adopted in the target countries concerning management, utilization, approval and control of phytosanitary products. Unfortunately, the said legislative documents are hardly disseminated or known by the public, which has resulted in circulation of certain products containing offensive active materials.

The management of pests and pesticides involves several categories of players whose roles and methods of involvement have impact that can influence in diverse ways the efficiency of management at the environment and health level: Research Institutions; Ministries in charge of Agriculture; Ministries in charge of Health; Ministries in charge of Livestock; Ministries in charge of Finance; the Local Governments; Private Operators; Research Laboratories and Institutions, Health and Environmental NGOs; Producers Organizations; beneficiary populations.

At the level of the target countries, several strategies have been adopted in pest management: preventive management, curative management and integrated management. The distribution and marketing channel for pesticides are mainly based on informal sale and very few private professional structures have been approved to engage in this activity. There are no comprehensive statistics on pesticide use in the countries. The compliance control of

pesticides in relation to their labelling is one of the so-called priorities. But there is lack of the necessary infrastructure for carrying out this control in the countries.

Pesticides are sometimes used mildly, even for medical purposes: there is a basic problem of information and sensitization. Agricultural producers as well as health structures generally do not have the appropriate warehouses for storing pesticides. The majority of the private users, including the populations, do not know about the adequate and pertinent use of pesticides and the different alternative methods, particularly within the context of integrated past management.

At the level of the technical services (Research Institutes, Ministries of Agriculture, Ministry of Health, Ministry of Environment, etc), knowledge on pesticides is better mastered. On the contrary, among the users, particularly the informal sales persons and uninformed members of the population, there is a high need for information, training and sensitization on the regulatory producers, the characteristics of the products and good enforcement practices. The majority of users (in both agriculture and health) are ignorant of the adequate and pertinent use of pesticides and the different alternative methods, particularly within the framework of integrated pest management Capacity building concerns mainly training on pesticide use and alternative methods for better advice in anti-vector control. Also, capacity building is necessary notably in the area of training on pesticide use and alternative methods for integrated management.

Besides, the protection and security measures are generally precarious. That is why the control and the compliance with standards of the storage and sale areas of pesticides have become a necessity in order to avoid or at least reduce the public's exposure to these products.

Also, to ensure these negative trends on the limitations to the rational management of pest and pesticides within the framework of WAAPP1C, the Pest and Pesticide Management Plan will help to initiate a process, and to support the national response in this sector. It will place emphasis on the preventive measures (institutional and technical capacity building; policy formulation and regulation, training, information, education and sensitization campaign centred on communication for behaviour change; appropriate materials, protection equipment, etc) and curative measures able to contribute to the improvement of the current pesticide management system (staff training for prevention and taking responsibility for poisoning from pesticides, capacity building of laboratories, etc).

The objective sought by the PPMP are: Strengthening the institutional framework of pests and pesticide management; Improving the legislative and regulatory framework of pesticide management; Improvement of systems of utilization and management of pesticides to protect the environment and the health of the handlers and the population; Building the capacity of the stakeholders, the communities in pests and pesticide management; sensitizing the populations about the risks linked with pesticides and involving the communities in the implementation of activities; Ensuring the monitoring and evaluation of the implementation of Pest and Pesticide Management Plan.

For a better coordination of the anti-vector control and pesticide management, a Steering, Monitoring and Multi Sector Consultation Committee (Agriculture, Environment, Research, Health, Finance, etc) will be set up in each country.

The cost of the PPMP is estimated at 580,000,000 CFAF. The following cost elements concern the activities likely to be sponsored under WAAPP 1-C. these are : (i) sub-regional-wide measures (105,000,000 CFAF), must be enforced by SE/CORAF/WECARD (Sub-Regional workshop on sharing the PPMP; Guide for use of good practices; Sub-Regional Workshop on sharing the PPMP; Guide for use of good practices; Sub-regional coordination and monitoring) which concern all the target countries and (ii) nation-wide measures (475,000,000 CFAF), specific to each country (set up a Coordination and Monitoring Committee; National workshop on sharing the PPMP; Support for the harmonization of national documents; Harmonization of national database; Support for the experimentation of biological control; Capacity building of structures of stakeholders; Sensitization of agricultural users and salesmen; Close monitoring; Mid-term supervision and evaluation; Final evaluation), and which will be conducted by the ESFP and the WAAPP 1C Coordination Units.

1. Introduction

1.1. Context

The present study of WAAAPP 1C covers the following countries: Benin, Republic of Guinea, Liberia, Sierra Leone and Togo.

The West Africa Agricultural Productivity Programme (WAAPP), financed with World Bank Support, is aimed at contributing to agricultural productivity and competitiveness through four (4) components: Regional cooperation in the generation and dissemination of technology; Centres of excellence; Technology generation; Coordination, Management, monitoring and evaluation. The second phase of WAAPP1 concerned four countries (Burkina Faso, Cote d'Ivoire, Niger and Nigeria). The program aims at broadening its scope of intervention from time to time, so that by the end of the programme it would have covered all the ECOWAS member countries.

Within the framework of WAAPP1c, research and extension activities have been provided to support agricultural production and the acquisition of inputs and seeds to boost agriculture. These activities could, in a direct or indirect way, encourage the use or increase the quantity of pesticides used or other control methods in agricultural activities due to the increase in the population of pests.

However, the use of pesticides or other methods not integrated into the framework of controlling vector insects and/or pests or weeds, depending on their nature or their mode of usage, can cause social, health and environmental damage which can delay the attainment of the project objectives. This use of pesticides, even in limited quantities, requires having a management plan for these dangerous products.

The analysis of the World Bank's conservation policies in WAAPP1C's Framework for Environmental and Social Management concluded effectively for the use of this policy. As such, in agreement with the World Bank's protection policy PO 4.09 pest management, this simplified plan was prepared to ensure the rational use of pesticides in pest management within the context of WAAPP 1c. The aim of this operational policy is to promote the use of biological or environmental control methods and to reduce the dependence on synthetic chemical pesticides and to ensure that the health and environmental risks associated with pesticides were reduced. In fact, in the agricultural sector projects financed by the World Bank, pests are controlled through Integrated Management Approaches such as biological control, farming practices as well as the development and use of varieties that are pest resistant or pest tolerant.

1.2. Objective of the PPMP

As such, within the context of the implementation of research and extension activities of WAAPP 1C, the pests and pesticide management plan designed to minimize the potential negative effects on human and health and the environment, which could stem particularly from within the framework of anti-vector control and to promote the integrated pest management.

One of the objectives of this plan is to assess the capacities of the institutional and regulatory framework of targeted countries to promote and support the effective and rational safety management of pests and pesticides and to incorporate into the project proposals for protection.

The present plan is integrated into the framework of the activities and other operational measures already prepared and proposed in the existing national strategies (ongoing or in prospect), thus strengthening the synergies and the complementarities, while avoiding duplications.

2. Presentation of WAAPP 1C

2.1. Objectives of WAAPP 1C

The West Africa Agricultural Productivity Programme (WAAPP), funded with support from the World Bank seeks to contribute to productivity and agricultural competitiveness through four (4) components: Regional Cooperation in generation and dissemination of technology, Centres of excellence; Technology Generation, Coordination, management, monitoring and evaluation.

2.2. General components of WAAPP 1C

The WAAPP 1C includes four main components described as follows:

• Component 1: Enabling conditions for regional cooperation in the generation and dissemination of technologies. This component seeks to strengthen mechanisms and procedures for the dissemination of technologies to enable countries to fully benefit from regional cooperation in technology generation. It uses achievements as a springboard, and will therefore be built on the achievements of the first phase of WAAPP to better support the improvement and alignment of national standards and regulations with those of ECOWAS.

Specifically, this component supports the following key areas: (i) the establishment of common regulations on genetic materials, pesticides and other crop protection products (CPP) at the ECOWAS level, (ii) a common framework for intellectual property rights (IPR) and other rights, such as farmers' rights and Geographical Indication (GI), (iii) the creation of national committees for recording and intellectual property rights for genetic material and pesticides in the participating countries, (iv) strengthening information systems on agricultural technologies and research expertise at the regional level, (v) the sharing of knowledge on adaptation to climate change.

• Component 2: Strengthening the National Centres of Specialisation (NCS). This component aims at strengthening the alignment of national priorities with regional priorities within the national agricultural research systems of participating countries (NARS).

• Component 3: Financing of the generation and adoption of technology based on demand.

• Component 4: Coordination, management, monitoring and evaluation. The sub-regional coordination of the Project is provided by the CORAF.

The sub-regional coordination of the Project will be ensured by CORAF.

2.3. Components of WAAPP 1C country per country.

2.3.1. Benin

- Component 1: Favourable conditions for regional cooperation in the domain of development and dissemination of improved technologies:

- Sub-component 1: Updating and implementation of regulations on Biotechnology and Biosafety;
- Sub-Component 2: Intellectual property regime in the agricultural sector;
- Sub-Component 3: Communication.

- Component 2: National Specialization Centre
- Sub-component 1: Capacity building
- Sub-component 2: Research, research development and scientific mobility
- Component 3: Funding in response to development and adoption of technologies:
- Sub-component 1: Funding development research on the basis of competitive funds
- Sub-component 2: Funding the running of the competitive fund;
- Sub-component 3: Funding technology transfer on the basis of the competitive fund

- Component 4: Coordination, management, monitoring and evaluation project

2.3.2. Guinea

- Component 1: Policy, regulation and regional cooperation
- Sub-component 1: Information system on seeds and markets;
- Sub-component 2: Harmonization and regulation of inputs.

- Component 2: Centre for Specialization, Research and Extension
- Sub-component 1: Centre for Specialization
- Sub-component 2: Development of technologies
- Sub-component 3: Agricultural extension and technology dissemination
- Sub-component 4: Building the capacities of research centres and stations

- Component 3: Access to rice markets
- Sub-component 1: Support to local small-scale processing
- Sub-component 2: Market Information systems
- Sub-components 3: micro credit to small scale rural sellers.
- Sub-component 4: Support to structuring of sector (inter-profession)

- Component 4: Project coordination
- Sub-component 1: Support to coordination of programme
- Sub-component 2: Monitoring-Evaluation of activities
- Sub-component 3: Training
- Sub-component 4: Impact assessment

2.3.3. Liberia

- Component 1. Establish Enabling Conditions for Regional Cooperation and Market Integration
  - Adoption of regional regulations on genetic materials and agrochemicals;
  - Support to the formulation and implementation of National Seed Policy (NSP), an Agricultural Research Policy, establishing a National Seed Certification System and National Registration Committee;
  - Support to regional rice market integration; and
  - Knowledge management, communication and information systems.

- Component 2. Building centres of specialization along the value chain that
  - Focus on areas of national priority aligned with a regional priority;
  - Demonstrate sustained public support for core priority activities;
  - Commit to collaboration with regional and international institutions; and
  - Commit to develop together and share results with other countries.

- Component 3. Technology generation and dissemination
  - Sub component 3.1 Support to Competitive Agricultural Grant System
  - Sub-component 3-2a: Support to accelerated adoption of released technologies
  - Sub-component 3-2b: Comprehensive action plan for human capacity building
  - Sub-component 3-3: Facilitating access to improved seeds

- Component 4. Project Coordination, Management, Monitoring and Evaluation

2.3.4. Sierra Leone

- Component 1: Enabling Conditions for Regional Cooperation and Market integration
  - Subcomponent 1.1 Common Regulations for the Registration of Genetic Materials and Agrochemicals at the ECOWAS level
  - Subcomponent 1.2 National frameworks for the seed sector and genetic materials
  - Sub component 1.3 Regional Rice & Cassava Market Integration
  - Subcomponent 1.4 Knowledge Management, Information and Communication System

- Component 2: National Centres of Specialization
  - Sub-component 2.1 Upgrading core facilities and equipment
  - Subcomponent 2.2 Building the Capacity of Researchers and Development Workers
  - Subcomponent 2.3 Supporting R&D programs of National Centres of Specialization

- Component 3: Funding of Demand-Driven Technology Generation and Dissemination
  - Sub-component 3-1: Demand-Driven Technology Generation
  - Sub-component 3-2: Technology Transfer
  - Sub-component 3-3: Support to agribusiness development for rice and cassava value chain

- Component 4: Project Coordination, Management, Monitoring and Evaluation

2.3.5. Togo

- Component 1: Suitable conditions for regional cooperation in development and dissemination of improved technologies
  - Sub-component1.1: Community regulations on genetic materials, pesticides and other phytosanitary products at ECOWAS level
  - Sub-component 1.2: National registration committee on genetic material and pesticides

- Sub-component 1.3: Information system on agrosilvipastoral technologies and competence in research at the regional level.

- Component 2: National Centres of Specialization
- Sub-component 2.1: Strengthening infrastructure and equipment
- Sub-component 2.2: Support to R&D and NSC programmes
- Sub-component 2.3: Improvement of mechanisms for technology transfer
- Sub-component 2:4: Building the capacity of researchers and technology transfer actors

- Component 3: Funding in response to the development and adoption of technologies
- Sub-component 3.1: Establishment of competitive fund Sub-component 3.2: Operationalisation of competitive fund
- Sub-component 3.3: Strengthening of national research and development system.
- Component 4: Project coordination, Management, Monitoring and Evaluation

3. Legal framework and institutional capacities

3.1. Legislative and Regulatory Framework Of Pesticide Management

The legal framework that has a direct and/or indirect relation with pest and pesticide management, calls for several legislative and regulatory texts at the national level as well as international agreements, treaties and conventions ratified by the countries.

3.1.1. International Conventions on the Environment

The countries targeted by WAAPP 1C have ratified or signed several international legal instruments relating to pests and pesticide management:

- Phytosanitary Convention for Africa
- Montreal Protocol
- Bamako Convention on Hazardous Wastes
- Basel Convention on Transboundary Movements of Hazardous Wastes and their Disposal
- Stockholm Convention on Persistent Organic Pollutants (POP)
- International Code of Conduct for the Distribution and Use of Pesticides
- Rotterdam Convention (PIC)

Among the aforementioned conventions, a certain number have a direct importance with pesticides and the fight against pollution, particularly the Stockholm Convention on persistent organic pollutants. This convention, in accordance with Principle 15 of the Rio Declaration on Environmental and Development, aims at protecting human health and the environment from persistent organic pollutants such as aldrin, dieldrin, chlordane, endrin, heptacholic, hexachlorobenzene, mirex, toxaphene, DDT and PCBs.

Besides, one will note the support for the document of harmonisation of rules governing the pesticide agreement in the ECOWAS zone adopted at the 60th ordinary session of the ECOWAS Council of Ministers held at Abuja on 17 and 18 May 2008. The aim of this common regulation is to:

- Protect the West African populations and environment against the potential hazards of pesticide use;
- Facilitate intra and inter-state trade in pesticides through the establishment of rules and principles accepted by common consent at the regional level to remove the trade barriers;
- Facilitate an appropriate and timely access by farmers to quality pesticides;
- Contribute to the creation of a suitable environment for private investment in the pesticide industry, and;
- Promote public-private sector partnership.

This regulation is applicable to all activities involving the experimentation as well as authorization, trade in utilization and control of pesticides and bio pesticides in the member countries.

3.1.2. Regulatory texts in Benin

There are several national legal texts that have a direct and /or indirect relation with pesticide management:

The Constitution of 11 November 1990

It approves the protection and management of a quality environment for the benefit of every citizen. It stipulates in its Article 27 that, "Every person has the right to a healthy environment."

Framework law on the Environment of 12 February 1999

This law was mainly aimed at:

(i) protecting the environment, particularly preventing and anticipating actions that are likely to have immediate or future effects on the quality of the environment; put a stop to any pollution or degradation, or at least limit its negative effects on the environment; promote sanitation with the aim of improving the living environment; closely monitor and constantly the quality of the environment;

(ii) restore the degraded areas and sites;

(iii) Ensure the balance between the environment and development. The law emphasizes the creation of awareness of the potential harm of that development programmes and projects can cause to human beings ad their environment. For that, it stipulates the conduct of environmental assessments (strategic environmental assessment, impact assessment on the environment, environmental audit).

The public hygiene code

The law No. 87-015 of 21/9/1987 on the hygiene code constitutes the first law focusing on the overall protection of the living environment. It includes very clear provisions on noise regulation, liquid and solid waste, industrial hygiene, and the use of pesticides.

The Plant Protection Regulation Law

The Law No. 91-004 of 11 February 19991 on the Plant Protection regulation in the Republic of Benin is specific on conditions for the marketing of phytopharmaceutical products must be approved. Getting this approval presupposes submitting the product for inspection of packaging, labelling, transport, storage, uses and elimination of expired products. This regulation allows to monitor the market of phytosanitary products after registration, to detect, if there is cause, that active materials have been distributed illegally, fight the use of active materials that are extremely dangerous and the sale of expired products, prevent unfair competition and the departure from the use of phytopharmacentical products and enforce good practices of utilization. This Phytosanitary Law of 1991, which still remains the reference, has not had any serious revision since its adoption. For that purpose, for example one can observe that the phytosanitary regulation law in the Republic of Benin is not in harmony with the existing regulation in CILSS. To that end, one may refer to Article 19 of the said law which announces an approval that is "valid for 10 years and renewable for a period covering the same duration," while this is not the case in the CILSS regulation.

Decree No. 92-258 of 18 September 1992 establishes the modalities for application of the previous law

The phytosanitary management falls under the responsibility of the National Approval and Monitoring Committee (CNAC) for phyto-pharmaceutical products which is under the authority of the Ministry of Agriculture.

The promulgation and dissemination of this law and the implementation of its Decree and its bye-laws for implementation have contributed to the elimination of the importation and utilization circuit of products that are highly and extremely dangerous. Within the framework of the application of the aforementioned decree, several orders were issued, the most important of which are:

- Interministerial application order No. 0255/MDR/MF/MCT/DC/CC/CP of 19 May 1993, bans the importation, packaging for sale on the national market as well as its use in agriculture of hazardous active materials.

- Order No. 93-186/MDR/DC/CC/CP relating to the labeing, packaging and the technical knowledge of approved phytopharmaceutical products indicates that the label of the products must indicate in clear and concise words, in French information on its usage, the characteristics of the product and then the related risks and security.

- Order No. 93-186/MDR/DC/CC/CP of 22 April 1993 relating to the supply and use of hazardous substances informs that the possession, sale and free distribution and use of substances containing dangerous active materials intended to be used to fight rodents, insects, dust mite and weeds must absolutely be subjected to a prior inspection and testing.

- Order No. 93-255/MDR/MFCT/DC/CC/CP of 19 May 1993 relating to the ban in agricultural use of active materials belonging to the composition of phytopharmaceutical products, lists the active materials, numbering 66 whose importation, packaging to be sold on the natural market, and use in agriculture are banned due to the risks resulting from their use. These active materials are presented in the Appendices.

- Order No. 95-591/MDR/MCT/DC/CC/CP of 26 October 1995 relating to the professional approval required before the sale of phytopharmaceutical products and their use by service providers mentions the documents to produce in order to be a professional distributor.

- Order No. 95-592/MDR/DC/CC/CP of 26 October 1995 specified the composition of the documents required for an application for authorization for testing and approval of phytopharmaceuticals.

- Order No. 335/MDR/MENRS/MEHU/MSPSCF/MCAT/CC/CP concerns the appointment of members of CNAC. This committee is made up of nine members 5 of whom are from the Ministry of Agriculture, 1 from the Ministry of Environment, 1 from the Ministry of Health, and 1 from the Ministry of Trade.

Unfortunately, the said legislative documents are not disseminated widely enough and not known by the public which has resulted in the circulation of certain products containing offensive active materials. Different actions have been taken by the government of Benin with

the view to controlling the importation and utilization of pesticides containing dangerous active materials. These are:

- The signing and circulation of a Ministerial decree banning the importation of mosquito coils containing DDT and any other pesticide that is banned from being introduced and used in Benin;
- The issuance of a memorandum by the Customs Department officially banning the unloading of mosquito coils containing DDT at the Cotonou port;
- The instructions given to the Inspection and Control Centres for plants and phyto-pharmaceutical products at the land borders, sea and air ports to work in concert with the customs agents. This measure concerns the application of the official decisions targeting the introduction and utilization of mosquito coils containing DDT and other pesticides whose introduction and use has been banned in Benin.

It is also worth noting that, as a supplement to these measures, Benin took an important action in 2009 with the Ministerial Decree No. 447/MAEP/MEPN/MC/DC/SGM/SA of 5 November 2009 relating to the ban on the importation, distribution and use of endosulfan in the Republic of Benin by calling in its Articles 3 on research services in plant protection in cotton to intensify their actions with the view to making alternative proposals that have been tried and tested as a supplement to the Thian 175 O-TEQ product.

These laws, decrees and orders serve as reference base for plant protection legislation in Benin. Also, once the approved phytopharmaceutical products have been distributed to the village associations and producers, there is no text that seems to deal with the conditions for shortage and use. And yet, it is at the grassroots level that people handle the highest risk of these hazardous products.
All in all, there is a law and a decree of application on the regulation of phytosanitary products, but it needs to be updated. A professional approval is required by a regulatory text to place phytosanitary products on the market and for their usage. Likewise, a decree lists the phytosanitary products banned in agriculture in Benin.

Benin has now adopted the CILSS common regulation on approval of pesticides. In view of Article 23 of the said regulation, Benin will have to adopt the application texts to conform to this common regulation.

3.1.3. Regulatory texts in Guinea

The basic text concerning the legislation on pesticides is Law No. L/92/028/CTRN of 6 August 1992. It was followed by its enforcement Decree No.D/94/PRG/SGG of 22 March 1994 on the application of the said law. These major texts have been completed with the following decrees:

- Law No. L/92/028/CTRN of 6 August 1992 instituting the legislation on pesticides promulgated in 1992, and which is aimed at a national policy on phytosanitary products (pesticides) and, particularly, the control of importation, marketing, labelling, utilization, testing, storage and elimination of expired products as well the manufacture, formulation, packaging or re-packaging and transport of the said products.

- Decree No. D/94/044/PRG/SGG pertaining to the application of the law dated 22 March 1994 defining the role of the Plant Protection Division in the application of the law; defining the competence of the National Committee on Pesticides and its composition and establishing the procedure for approval, breach of the law and penalties.

- Order No.095/6205/MAEF/SGG/95 of 07 November 1995 appointing members of the National Committee on Pesticides, modified by Order No. 5071/MAE/SGG/99 of 14 September 1999.
- Order No.5710/MAEF/SGG/96 on interim measures on the application of registration of pesticides.
- Order No.5711/MAEF/SGG/96 of 3 October 1996 on pesticide registration documents.
- Order No.5712/MAEF/SGG/96 of 3 October 1996 on the required professional approval for the application of pesticides by service providers.
- Order No.5713 /MAEF/SGG/96 of 3 October 1996 on the protection of workers exposed to agro-chemical products.
- Order No.5714/MAEF/SGG/96 of 3 October 1996 on the professional license required for the importation, re-packaging and marketing of pesticides.
- Order No.5715/MAEF/SGG/96 of 3 October 1996 on the testing of pesticides for their registration.
- Order No.5716/MAEF/SGG/96 of 3 October 1996 on the labelling and packaging of pesticides.
- Order No.315/MAE/SGG/2000 on the temporary authorisation for the sale of agro-chemicals.
- Order No.316/MAE/SGG/2000 on measures and arrangements to put in place for the transport, storage and distribution of agro-chemicals.
- Order No.317/MAE/SGG/2001 of 1st February 2001 on the list of products benefiting from interim measures for the registration of agro-chemicals.

- Decree No.2395/MAE/SCG/2001 of 6 June 2001 relating to the restriction and/or ban of the use of active substances in agriculture. The decree establishes the list of active substances whose use in agriculture in Guinea is either banned or subjected to restrictions. This list takes into consideration the specific provisions of the Rotterdam and Stockholm Conventions on the management of dangerous chemical products. The active substances listed in the decree are available in the Appendix.

As presented above, Guinea possesses a whole battery of laws which are relatively comprehensive and pertinent, covering all aspects of pesticide management. However, the application is not mainly effective due particularly to the non existence of application texts and the ignorance of the texts by the main stakeholders, and certain texts deserve to be updated and made to comply with the requirements of ECOWAS, in particular, on the subject.

3.1.4. Regulatory texts in Liberia

Legislative frame of pesticide management

Since the development of The Liberia Agriculture Policy and Strategy document in 2008, matters remained the same without any legislation. At the moment, the Ministry of Agriculture lacks a legislative frame of pesticide management. As a result, there is no

structure or organogram indicating units and their functions. Currently, it is only the Division of Plant Quarantine which performed regulatory services on pesticides imports and not management. The Division issues import permits to importers and small-scale distributors who sell agro-chemicals. In addition, at border posts, many of which are porous due to capacity problems, agro-chemicals are brought into the country without proper regulation and the consent of the Ministry of Agriculture. Agro-chemical uses are also usually not monitored. Empty agro-chemical containers after use are left in the environment without being properly disposed of. Meanwhile, field reports indicate that rural dwellers use these containers for other purposes thereby posing health, environmental and other risks to community dwellers that are not knowledgeable of chemical residue in the containers.

The present framework of the Ministry provides for a National Quarantine Service. The 1948 Liberian Agriculture Law Number XXXIX was last reviewed in 1972. This Law consists of three Chapters: The Plant and Animal Quarantine Act, The National Livestock Artificial Insemination Act and the Protection and Development of Agriculture Products Act. The purpose of the Plant and Animal Quarantine Act is stated as follows: …*to prevent entry into Liberia of injurious plant and animal pests and diseases existing in foreign countries; to prevent spread of such pests and diseases should they become established in Liberia; and to regulate the export of plants animals to conserve dwindling species and protect the food supplies of the Republic.*

This Agriculture Law is very deficient, weak and outdated as there is no evidence that the MOA has the power to enforce it. There should be a pesticide act under the plant protection service to regulate the importation, distribution, and use of pesticide in order to promote sustainable food and agricultural production: Assist dealers in pesticide and application equipment to comply international procedures and guidelines, for the importation, distribution and sale of pesticide; Put in a place collaborative mechanism with international and regional research institutes for pesticide management;
Establish a pesticide laboratory at CARI. Therefore, the Division requires a major revision and updating. Moreover, pesticides management should be left with a different unit with a mandate to oversee pesticide matters.

3.1.5. Regulatory texts in Sierra-Leone

Legislative frame of pesticide management

Currently there is no existing Regulation for Pesticide Management in Sierra Leone. The existing Legislation is the Environment Protection Agency Act 2008, which has established the Environment Protection Agency (EPA). The new Environmental Protection Act is divided into 6 Parts and arranged in 63 Sections as follow:

- Part I Preliminary- Section 1, Part II- Establishment of Environment Protection Agency – Section 2- 11, Part III Functions and Management of the Agency- Section 12 -22, Part IV Environmental Impact Assessment- Section 23 - 39, Part V Ozone Depleting Substances- Section 40-52 and Part VI Miscellaneous- Section 53 - 63.

- In the EPA Act, provision is made only for Hazardous Substance under Part VI Miscellaneous–Section 58-59, described the importation, storage and disposal of toxic or hazardous Wastes, and not pesticides.

Obviously, there is a manifest deficit of specific texts covering all aspects of pesticide management. Also, there is the need to establish legislation, ensuring that they conform with the requirements of ECOWAS in particular on the matter.

3.1.6. Regulatory texts in Togo

The Togolese Constitution of 14 October 1992 explicitly acknowledges the government's obligation in guaranteeing the physical and mental integrity and life (Article 13), the right of citizens to health (Article34) and the right to a healthy environment (Article 41).

The framework law on the environment No. 2008-005 of 30 May 2008 establishes the general legal framework for environmental management in Togo. It aims at: protecting and sustainably managing the environment; guaranteeing for all citizens a living environment that is ecologically healthy and balanced; creating the conditions for a rational and sustainable management of the natural resources for present and future generations; establish the basic principles for managing and protecting the environment against all forms of degradation in order to develop the natural resources, fight against all types of pollution and harmful substances; improve in a sustainable manner the living conditions of the populations with respect for equilibrium with the environmental conditions. It approves the protection of the environment, the conservation of natural areas, landscapes, animal and plant species, the maintenance or restoration of ecological balance and natural resources, risk prevention, control of activities likely to damage the environment and cause harm to the health of persons or the goods, the reparation or compensation of damages suffered, the protection of natural resources and generally, of the environment as actions of general interests that promote sustainable development.

Law regulating plant protection in Togo

The use of pesticides in Togo is legally governed by Law No. 96-007/PR of 3 July 1996 pertaining to plant protection and its texts of application. Made up of 50 articles grouped into 5 main chapters, the 1996 law forbids the importation, manufacture, packaging or re-packaging, storing, testing, using or marketing any unauthorized or unregistered phytopharmaceutical product. A decree and orders concerning the application of Law No. 96-007/PR have been signed in order to regulate pesticide use. These are in particular:

- Decree No. 98-099/PR of 30 September 1998 on the application of Law No. 96-007/PR of 3 July 1996 relating to plant protection;
- Order No. 29/MAEP/SG/DA of 20 September 2004 setting the conditions for the issuance of different types of authorizations, approvals and registration of phytopharmaceutical products in Togo;
- Order No. 30/MAEP/SG/DA of 21 September 2004 banning the importation and use of methylic bromide to Togo;
- Order No.31/MAEP/SG/DA of 21 September 2004 banning the importation of organochloride in Togo; and
- Order No. 34/MAEP/SG/DA of 20 October 2004 temporarily authorizing the sale of phytopharmaceutical products;
- Order No. 04/MAEP/SG/DA of… on the composition of the documents for the application for authorization to carry out testing, temporary authorization for the sale and approval of phytopharmaceutical products;

- Order No. 03/MAEP/SG/DA of 20 January 2000 concerning the professional approval required for the importation, marketing, formation, re-packaging of phytopharmaceutical products and the uses by the recipients.

It must be noted that beside the offensive pesticides, there are also persistent organic pollutant pesticides (POP) regulated by the Stockholm Convention. Through the ratification of this convention, Togo pledged to support the international community in the fight to eliminate the said substances. As such, it initiated the process for its implementation by inventory assessment which led to the preparation of the national profile for the implementation of the POPs.

Besides, Law No. 2005-005 of 30 May 2008 on the framework law on the environment which states the need for protection and rational management of the environment also takes these demands into consideration.

Togo has not yet developed the standards for the waste in the atmosphere, water and the soil. The activities of the present project will be subjected to the standards that are recognized internationally particularly those of the World Bank or the European Union.

3.2 Institutional framework for pesticide management

The anti-vector control and pesticide management involves several categories of actors whose roles and mode of involvement have such an impact which can influence in different ways the effectiveness of environmental and health management: the Ministries of Environment, Agriculture, Health, Livestock, Finance; Local Communities; Private Operations, Research Laboratories and Institutions, NGOs dealing with health and environment issues; Producers' Organizations, Development Partners, and the beneficiary populations.

3.2.1. The institutional framework in Benin

The Ministry of Environment and Nature Protection (MEPN)

The Ministry of Environment and Nature Protection (MEPN) is to prepare the national policy and government programmes on the environment, sanitation, pollution and harmful substances.

The Environmental Agency of Benin (ABE), established by decree since 1995, and instituted by the framework law on the environment, it is the support institution for the national policy on environmental protection. It is in charge of the implementation of the environmental policy defined by the government under the general development plan. For that purpose, it has the responsibility of implementing the procedures for environmental impact assessment and environmental audit. It is also charged with giving technical advice on all issues relating to the pollution and potential pollutants.

The Ministry of Agriculture, Livestock and Fisheries (MAEP)

This ministerial department, through the Department of Agriculture (DAGRI), is mainly concerned with pesticide management, particularly for use in agriculture. In the area of control of phytosanitary products, DAGRI relies mainly on the Plant Protection and Phytosanitary Control Service (SPVCP) and the National Committee for Approval and monitoring of Phytopharmaceutical products (CNAC) which is chaired by the head of the Plant Protection and Phytosanitary Control Service. On this relation, one can note that there are national capacities for monitoring and policy implementation for agricultural pesticides, especially concerning the use of DDT for agricultural purposes.

The National Committee for Approval and Monitoring of Pharmaceutical Products (CNAC)

The CNAC is in charge of proposing and monitoring of the enforcement of the principles and general orientations of the regulation of phytopharmaceutical products and professional approval. All requests must be addressed to the CNAC, in charge of studying the applications and decide on the requests.

Plant Protection and Phytosanitary Control Service (SVPCP)

The SVPCP is in charge of controlling the professional approvals and imported and distributed phytopharmaceutical products. The controls are carried out by plant protection inspectors, "on the basis of the Manual of the Plant Protection Inspector," at the level of the land borders, port and airport, and by the SPVCP agents at the departmental level. Priority controls are checking the labelling and packaging that must be done at the level of warehouses or distribution points of the products (inspection of formulations and how they conform with the labels; inspection of residue in agricultural products especially in relation to the Maximum

Residue Limit admitted by the Codex Alimentarius Commission of FAO and WHO; inspection of approvals of products and registration).

The SVCP is also in charge of product formulation and use, as well as the management of expired stocks and reuse of packaging. The Plant Protection and Phytosanitary Control Service (SPVCP), with the financial support of the DDSA and AIC (Inter-Professional Cotton Association) initiated different information and training sessions for different socio-professional categories. The structures in charge of the distribution of pesticides, the warehouse keepers of these structures and several supervisory officers of these producers participate in these training sessions. The training of pesticide users is a major concern of the SPVCP. To do that, training sessions are often organized by the service for producers and users.
This service also gives assistance to the installation of village warehouses for storing pesticides, respecting the layout standards. It also ensures the training of warehouse managers and the monitoring of their functioning. Training sessions are initiated by the pesticide manufacturers but their main target is to promote the use of their products.

According to the SPVCP authorities, the control of agro-chemical products requires an incredible number of workers, in view of the magnitude of the task. “The CNAC has approved less than 20 product distributors but illegal products are brought into the country in large quantities from neighbouring countries.”

For a few years now, the SPVCP is working hard to promote an alternative form of control. As such, the SPVCP is directing its actions toward integrated protection and takes into consideration the use of plants with insecticide effect and the promotion of the use of bio-pesticides based on entomopathogenous fungus for the control of the harmful types. It is also applying itself to the promotion and dissemination of the Targeted Gradual Control (TGC) among cotton producers.

The Ministry of Public Health (MSP)
The MSP is engaged in pesticide management mainly through the National Malaria Control Programme (PNLP), is an integral part of the National Health Protection Department (DNPS) which is a technical department of the Ministry of Public Health (MSP), but also the Department of Hygiene and Basic Sanitation (DHAB) where workers constitute the basic vehicles of the anti-vector control within the MSP; the National Public Health Laboratory, the Entomological Research Centre of Cotonou (CREC); the health centres which constitute the specialized units for the treated mosquito nets.

3.2.2. The institutional framework in Guinea

The structures responsible for the monitoring of the instruments for pesticide management in Guinea are: The National Pesticide Committee in charge of:

- Proposing general principles and orientations for pesticide regulation;
- Examine the risks of toxicity for human beings, animals and the environment of products mentioned in Article 2 of the Law No. L/92/028/CTRN of 6 August 1992;
- Eventually propose to the Minister for Agriculture a list of pesticides whose use is banned or limited due to the risks mentioned in the previous paragraph;
- Propose to the Minister of Agriculture all measures that are likely to contribute to the normalization, definition and establishment of the conditions and modalities of the use

of pesticides concerned by Law No. L/92/028/CTRN of 6 August 1992 in view of their effectiveness all kinds of inconveniences they make cause;

- Define the control methods of the composition and the quality of the products presented for authorization or registration, assess them;
- Receive, examine and control the requests for authorization and registration;
- Express an opinion on the request for license mentioned in Article 10 of the Law No. L/92/028/CTRN of 6 August 1992;
- If the need arises, seek the expert advise of laboratories approved by the Ministry of Agriculture;
- Give opinion on all the issues that the Ministers concerned have submitted to him.

The National Pesticides Committee is made up of several technical services, particularly the National Plant Protection Service which chairs this committee, the National Department of Environment which serves as the Vice-Chairman, the National Customs Department, the Ministry of Health, Security, etc.

The National Plant Protection Service is responsible for:

- the development and implementation of the national policy on plant protection and relating to agro-chemical products;
- making an estimate of the pesticide needs (insecticides, fongicides, nematicides, acaricides, raticides, growth regulators, etc) and treatment materials;
- give advice to pesticide users for their effective use without danger to human beings and the environment;
- prepare and enforce all legislation on the formulation, manufacture, importation, marketing and use of pesticides;
- prepare a list and describe pesticides distributed and marketed in Guinea;
- apply all international conventions ratified by Guinea and the international code of conduct for the distribution and use of pesticides by FAO;
- prepare and publish a national list of agro-chemicals;
- make a list of obsolete and expired pesticides;
- issue import licenses of pesticides which have already been registered and authorized for sale;
- take charge of secretariat of the Pesticides Committee;
- examine all the requests for registration, professional approvals sent to the National Pesticide Committee.

The National Plant Protection Service is endowed with a National Plant Protection Laboratory which, through it Plant Pathology Section, prepares a list of crop pests, assesses the damages and develops the appropriate control methods. In addition, the Weeds section is in charge of researching and identifying the main weed species and give advice on control methods.

Agricultural Research Institute of Guinea (IRAG) is, among others, in charge of: Conduct laboratory testing of pesticides submitted for registration or a temporary authorization for sale, in collaboration with the national plant Protection Service.

The National Rural Development and Extension Service, renamed the **National Rural Development and Agricultural Extension Agency** is, among others, in charge of: participating in the testing of pesticides in the farming areas; ensure the extension of

technical itinerancies developed for the use of registered pesticides; participating in the periodic control of pesticides used in the farming areas and inform the technical services about them;

The National Department of Public Hygiene in charge of ensuring the respect of the quality standards of portable water, environmental hygiene, housing and use of insecticides in anti-vector control in public health.

The National Department of the Environment has as a mission "the design, preparation and implementation of government policy on prevention and the fight against all types of resource degradation, pollution and dangerous substances."

Private commercial operators in pesticides: currently in Guinea, there are more than twenty (20) approved operators (Seref International, SPECIA, Tidiane Agriculture, etc) for the importation and distribution of pesticides and 33 private agro-chemical treatment agents (APTP) for the risk-free application of pesticides.

At the institutional level, it is worth noting that the public hygiene department and the National Plant Protection Service are two services set up recently and consequently, are in the process of being organized.

Some weaknesses must be noted in relation tot eh management of pesticides which are among others:

- Lack of training of the national personnel responsible for the procedure "prior information and consent" (PIC);
- Lack of anti poison centres and the skills to diagnose and treat pesticide poisoning;
- Lack of pesticide sampling and quality analysis materials;
- Lack of data processing equipment.

3.2.3.Institutional framework in Liberia

Due to the absence of a National Plant Protection and Regulatory Services at the MOA, the Quarantine Division serves a service provider only. In collaboration with EPA of Liberia, a joint monitoring task force was formed to monitor pesticides use. The EPA serves as chair, MOA as co-chair and the Ministry of Health and Social Welfare as a member. The MOH & SW has the authority to intervene in case of accidents to render first aid treatments and at the same to monitor pesticide use in terms of vector control as the case with DDT for control of mosquitoes. In addition to the three institutions, CARI should be included for the purposes of conducting research involving pesticide screening and application.

However, the task force suffered many constraints such as lack of inter-agency collaboration, lack of information sharing and budgetary constraints. This may be the result of unclear policies implemented by these institutions.
Also, importers and small scale distributors of pesticides managed pesticides since these compounds are in their custody for sale. What is not clear is the link between the ministries and these sellers in joint management of these compounds. The lack of capacities to monitor these sellers poses serious problems in the overall management of agro-chemicals. As indicated, there are some distributors who bring the pesticides into the country without the knowledge of the MOA or the EPA. As such, pesticide management by institutions in the country is at risk.

3.2.4. Institutional framework in Sierra Leone

Crop Protection Unit (CPU)

The Crop Protection Service (CPS) is position under the Crops Division of MAFFS and is responsible of the management of field, storage and quarantine pest and diseases, and the purchase and management of pesticides used in Agriculture. The CPS is divided into two Sections namely: Field Operations and Phytosanitary Services. The Field Operations deals with general pest management extension and provides technical advice on pest and pesticide management to farmers, through:

- Surveillance, Monitoring and control of pests
- Training farmers on general crop protection and safe use of pesticides
- Disinfestation of storage facilities
- Pesticide distribution to farmers.

Furthermore the Crop Production Guidelines for Sierra Leone published in July, 2005 by the FAO, provides useful information on pest and pesticide management. The Sierra Leone Agricultural Research Institute (SLARI) Annual Reports also contains summaries of pest and disease survey reports including some on-going research on new resistant varieties of cassava and rice.

There is no existing pest and pesticide management plan, IPM Policy, Database of pest and disease and checklist, but has adopted the Farmer Field School Concept and Agricultural Business Units [ABU].

The staff capacity is very thin compared to the scope of work and having to cover 13 Districts and the 7 Phytosanitary entry points . There is a Consortium with support from the Rural and Private Sector Development Project to develop a policy framework for Phytosanitary legislation for Pesticide management in Sierra Leone. The average staffs posted at the 13 Districts are 2-3, and there is a vacuum at Blocks and Village levels. The staffs at the District level are moderately trained holding Ordinary National Diploma and Higher National Diploma in Agriculture but few are professionally trained in crop protection disciplines. At the upper hierarchy, graduates with MSc .and PhD are available. The Unit lacks crop protection equipment, training on IPM, pest and pesticide management, pesticides and mobility to function effectively. They are responsible to manage pesticides and there are no pesticide storage facilities.

The major activities conducted are training of trainers course for farmers on the safe use pesticide has been done last year and a total of 2400 farmers benefited, monitoring of pest and disease, organizing plant health clinics and procurement of crop protection equipment. Currently small quantities of pesticides, equipment and protective gears have been purchased for resale to farmers at 50% of their cost price. Table below indicates these pesticides and protection materials purchased:

Pesticides, Equipment and Protective Gears Purchased by Crop Protection Unit/MAFFS

Pesticide trade name	Type	Quantity	Remarks
Propanil	herbicide	4,000 Litres	To control weeds on rice
Chlorophyriphos ethyl. Ec.	Insecticide	1,100 Litres	To control termites and soil insects
Diazinon Ec .	Insecticide	1,100Litres	To control stemborers

Methlyeugenol	Pheromone	30 Litres	To control fruit-flies
Protective Gears		100 sets	To protect applicator
Knapsack sprayers		150 Units	To apply pesticides

There exists a Phytosanitary Service under the Crop Protection enforcing the Import Permit Legislation enacted in 1974, to prevent the introduction of spread of quarantine pests into the country. There are Inspectors posted at the Airport, Seaport, and other 5 posts established at the borders of Liberia and Guinea. The Plant Health Posts lacks inspection materials, identification and procedure manuals, and above all, they need professional training with a good laboratory for identification services.

Environmental Protection Agency (EPA)

The Environmental Protection Agency (EPA) is now the lead Agency with autonomous authority for Environmental Protection and Management, including other chemicals and other related matters. The EPA has a Board of Directors responsible for the control and supervision of the Agency, and provides policy guidance and ensures efficient implementation of the functions of the Agency, and enhances the overall performance of the Agency.

The EPA Board members are gathered from the Ministries of Environment, Local Government, Mineral Resources, Marine Resources, Agriculture and Forestry, Tourism, Trade and Industry, Transport, Health, Petroleum Unit, three other persons outside the civil services and the Director. The Executive Chairman and other members of the Board except the Director shall hold Office for three years and shall be eligible for re-appointment for not more than one term.

The Agency is headed by a Director and assisted by three Deputy Directors who are in charge of field operations and extension, planning policy and research, finance and administration. The Agency has established the following departments:

- Chemical control and management department
- Information, education and communication department,
- Environmental compliance and enforcement department,
- Inter-sectoral and International cooperation department,
- Finance department
- Administration departments.

3.2.5. Institutional framework in Togo

Ministry for Environment and Forestry Resources (MERF)

This department is responsible for the coordination, adoption and implementation of government policies on the environment, forestry resources and wildlife. It also has a mission of preparing the legislation on environment protection, prevention and fight against pollution and harmful substances. Within the MERF, the prerogatives concerning the management of pesticides, chemicals and other chemical products are under the jurisdiction of the Department of Environment (DE). It is the DE which handles the conventions dealing with chemicals and pesticides.

Ministry of Agriculture, Livestock and Fisheries (MAEP)

The ministry's intervention takes place at three levels: management of phytopharmaceutical products; management of chemical fertilizer; management of veterinary products. Through

the Plant Protection Department (newly established), the Ministry, among others, is in charge of the preparation; enforcement and monitoring of regulatory legislation on plant protection, control of the agro-chemical market, preparation and updating of the list of registered agro-chemical products, professionals approved for phytosanitary treatment, formulations, distributors, and vendors of agro-chemicals. The Inputs Supply and Management Central store ensures the supervision of the importation of chemical fertilizer and pesticides and the Plant Protection Department (DPV) serves as the framework for the preparation for the regulation of chemical products for agricultural purposes in general.

The Committee on Phytosanitary Products (CPP)

The Order No. 24/MAEP/SG/DA of 30 October 1998 concerns the creation, competence and composition of the Phytosanitary Products Committee (CPP). The CPP is in charge of proposing and ensuring the respect of the principles of the general orientations of the regulation of phytosanitary products and professional agreements.

The health services ensure the control of the security standards of food and take a number of protection measures to prevent food items from being contaminated through spraying and / or as a result of the unhygienic environment, in appropriate treatment at the different stages of the food chain.

Other Stakeholders

There are several Professional Associations, Non-Governmental Organizations involved in the management of chemical products and also support and advice structures such as the Institute for advice and Technical Support (ICAT), as well as research institutions and testing laboratories: Research institutes, university faculties and academic laboratories with the equipment to make chemical analysis (Higher Technical Biological and Food Institute, ESTBA; Laboratory for Applied Hygiene; the ITRA Laboratory). Building the technical capacities of the laboratories remains an essential factor to support the few laboratories and specialized services in the different analyses to control the behavior of chemical substances and their impact on the environment and human health.

All in all, the ministerial, university, private and NGO structures possess considerable potential to ensure good management of phytosanitary products. However, this potential is still latent due to: the lack of a general policy for the management of chemical products; lack of coordination of the activities in the area at the level of the few structures that are interested in it; the lack of adequate infrastructure in the technical serviced laboratories; lack of qualified human resources. However, one must emphasise the heaviness and complexity of the institutional framework on the matter, particularly in terms of coordination between the ministries/agencies responsible for the activities of assistance and those responsible for health protection, security or the environment.

4. PEST AND PESTICIDE MANAGEMENT APPROACHES IN AGRICULTURE AND PUBLIC HEALTH

4.1. Pests found in agriculture and public health

4.1.1. Pests found in agriculture

Les major pests and disease damaging to crops and stocks encountered in the countries are described in the following Table 1:

Table 1: Major pests damaging to crops

PESTS	SCIENTIFIC NAME	TARGET CROP
True armyworm	Spodoptera exempta	Grasses
Rice beetle	Trichispa sericea	Rice
Stinking grasshopper	Zonocerus variegatus	Maize, cassava
Potato tuber moth	Phtorimaea opercullela	Potato
Rat tailed caterpillar	Epicampoptera strandi	Coffee
Grey field slug	Deroceras riticulatum	Rice, tomato, cassava a, banana
Fruit fly	Ceratitis spp	Citrus
Asian Fruit fly	Bactrocera invadens	Mango
Bacteria	-	Several
Grasscutter	Thrynomys swinderianus	Rice, maize, millet, cassava
Cassava mealybug	Phenacoccus manihoti	Cassava
Mango mealybug	Rastrococcus invadens	Mango
Larger grain borer	Prostephanus truncatus	Maize
Black sigatoka disease	Phaeoramularia angolensis	Citrus
Cassava green mite	Mononychellus tanajoa	Cassava
Adventives	Striga sp.	Several
Adventives	Chromelariaodoratum	Several
Bean pod borer	Maruca testilalis	Dwarf bean
Cotton bollworm	Helico verpa armigera	
Red spider mite	Tetranychus urticae	
Leaf miner	Liriomyzatrifolii	
Fruit fly	Didacus spp	Melon
Cucurbit beetle	Henosepilchna elaterii	
Plant lice	Aphis gossypii	
Mildew	Pseudoperonospora	
Oidium	Erysiphe cichoracearum	
Tomato fruitworm	Helico verpa armigera	Tomato
Green bug	Mysus persicae	
Tomato russet mite	Aculops lycopersici	
Tomato bacterial gall	Xanhomonas vesicatoria	

Thrips	Thrips tabaci	Onion
Tomato fruitworm		
Pink root	Pyrenochaeta terrestris Fusarium	
Insects (20)		Cabbage
Mildew	Peronospora parasitica	
Stem borer	Lépidoptères (lema planifronsWs,	Millet
Termites (microtermes sp), grasshoppers, cluster caterpillar		Sorghum
The main weeds on rice fields include *Ageratum conyzoides,*		Rice

4.1.2. Pests in Public Health

Vector-borne diseases (VBD): malaria (*Anopheles gambiae*), Bilharziasis (*Schistosoma haematobium*), onchocerciasis (*Onchocerca volvulus*), filarial disease (*Wucheweria bancrofti*), arbovirosis (*Aedesfurcifer, Aedesluteo cephalus, Aedestaylori, Aedesneo africanus, Aedesvitatus* and *Aedesaegypti*), dracunculiasis (*Dracunculus medinensis*), and the human African trypanosomiasis (*Glossina palpalis gambiensis, Glossina morsitans sub morsitans*) constitute a major sanitary issue in West Africa. In the countries targeted by WAAPP 1C, the various vectors of malaria known are: *Anopheles gambiae s.s., Anopheles arabiensis, Anopheles funestus* and *Anopheles melas.*

4.2. Integrated management approaches in Benin

From time immemorial, the conventional chemical control has been the means generally used to control crop invasions by pests. This approach has led to numerous cases of recorded intoxications each year, the resistance of numerous pests to many chemicals (case of *Helicoverpa armigera* to pyrethroids), the destruction of useful species, the perturbation of the ecological balance, the dependence towards synthetic chemical pesticides and the growing debt of farmers compelled to use increasingly expensive products, the deviances in the use of cotton pesticides on some food crops such as cowpea, etc.

As a component of sustainable agriculture, integrated pest management is a response based on the observation of pests and the understanding of their ecology and biology by farmers. It is based on analysis and management practices and techniques capable of reducing the frequency of attacks by pests, the incidence of plant diseases and the decrease in the use of synthetic chemical pesticides.

In Benin, in a quest to reduce the increased use of synthetic chemical pesticides in combating pests, the following methods were considered: biological control, Staggered Targeted Control (STC), physical or manual control and the use of aqueous plant extracts and of attractive plants.

The National Agricultural Research Institute of Benin (INRAB) is the state agency mandated to develop crop pests control practices. It fulfils this mission through research units which are the *Laboratoire de Défense des Cultures* – LDC (Crop Protection Laboratory) which deals with researching pest control in general and the research stations which deal with specific crops (research stations on food crops, oil palm, rice, coconut tree, coffee, cocoa, cotton and fibre). The findings of these research units are extended by the Plant Protection and Plant Quarantine Services (SPVCP) for the Agriculture Directorate (DAGRI) which also deals with plague control. These services are assisted in their task by other structures such as the Regional Centres for Agricultural Promotion (CeRPA) which are responsible for extending

pest control methods in each department of the country, in Farmers' Organizations, and in NGOs that invest a lot more in control methods that reduce to the strict minimum the use of synthetic chemical products.

Within the framework of the implementation of alternative pesticide use methods in Benin, the SPVCP has initiated biological control programmes in collaboration with some international partners. These programmes involve:

- Biological control of locusts through a regional project entitled *Lutte Bioloique contre les Locustes et Sautériaux dans le Sahel* – LUBILOSA (Biological Control of Locusts and Grasshoppers in the Sahel). The main objective of this project was the use of a biopesticide developed from an entomopathogen fungus, *Metarhizium flavoviride*, for locust control (*Oedaleus senegalensis, Hieroglyphus daganensis*). The spores of this entomopathogen are mixed with petroleum and groundnut oil in well defined proportions;
- Biological control of Mango mealybug (*Rastrococcus invadens*) from two hymenopterous larvae parasites, *Gyranusoidea tebygi* and *Anagyrus mangnicola*;
- Biological control of green spider mite *Mononychellus tanajoa* and the Cassava mealybug *phenacoccus manihoti*;
- Biological control of water hyacinth *Eichhornia crassipes* and other aquatic weeds with the use of many natural enemy species;
- Biological control of the Larger Grain Borer, *Prostephanus troncatus* with the *teretriosoma nigrescens* in granaries containing stored maize and in forests or shrubby areas, to reduce the pressure of *proste-phanus troncatus* in nature.

These biological control programmes were executed during the 1988 - 2000 period. The Songhai Centre also performed biological control tests on a small-scale and trained young people in agricultural self-promotion.

The Staggered Targeted Control (STC) programme was implemented by the Exploitation Systems Improvement and Diversification Project (PADSE), in collaboration with the Agricultural Research Centre - Cotton and Fibres (CRA-CF) on cotton. It is a sound, economical, and environment-friendly control method. Experiments of this control method started in the 80's on small surfaces. The PADSE started its activities in 2000 for a five year-period. It intervenes in the Borgou Alibori and Zou-Collines Departments. The objective of this project is to assist farmers in adapting their farming systems to environmental changes.

The basic principle of the STC is the use of reduced doses of pesticides as compared to calendar unsound recommended dosages. Observations are made weekly on 40 plants and thresholds have been set for the six main cotton pests identified in Benin. Treatments are executed only if these damage thresholds are reached.
For the STC, this association is applied in reduced dosage (half dosage as compared to regular treatments). The additional half dosage is applied the following week if the corresponding thresholds are reached (other carpophaga or increments for the pyrethroid; acarids or *Syllepta derogate* for the organophosphorous acaricide. The new products, Indoxacarbe (25g/l) or Spinosad (48g/l) are not used if the threshold "*Helicoverpa armigera*" is reached and only from the 66^{th} day after the test. They are never applied two weeks consecutively. Acetamipride (8g/l) is used if the aphids threshold is reached from the 94^{th} day after the test. It is never applied two weeks consecutively.

The method described above is the Full Staggered Targeted Control (FSTC) applicable only in the north of Benin (Borgou-Alibori, Atacora-Donga). In the south (Zou-Collines, Mono-Couffo, Ouémé-Plateau), another method, the Partial Staggered Targeted Control (PSTC) is developed because of the false coding moths (*Cryptophlebia leucotreta* and *Pectinophora gossypiella*) which are countless on plants. In this case, a full dosage of pyrethroids is applied during treatments 3 to 6.

This reduction enables to decrease the quantity of active material spray on crops, which translates generally in an improved respect of the environment, a reduction of the selective pressure, thus an improved prevention and management of the insecticide resistance phenomenon, and finally a reduction in inputs costs.

However, some phytopharmaceuticals recommended by the STC are not included in the list of approved phytopharmaceuticals. This does not help to determine their side effects. They are: Gazelle 200 SL and Hostathion 400 EC.

Other forms of chemical pest control used in Benin are the manual control and the use of aqueous plant extracts. Currently they are extended especially by Non-Governmental Organizations (NGOs) such as *Organisation Béninoise pour la Promotion de l'Agriculture Biologique* –OBEPAB (Organization for the promotion of Biological Agriculture of Benin), the *Réseau Africain pour le Développement de l'Agriculture Durable* – REDAD (African Network for Sustainable Agricultural Development), the *Levier pour le Développement Durable Local* – LDLD (Leverage for Sustainable Local Development), in the production of biological cotton; the Faculty of Agricultural Sciences through the Integrated Management of cowpea pests Project, The Cowpea project for Africa (PRONAF) and the Ecologically Sustainable Cassava Plant Protection Project of the International Institute of Tropical Agriculture (IITA). However, it should be noted that the SPVCP extended the use of aqueous Neem extracts for pest control in the 80's.

The physical control recommended by OBEPAB, consists in the collection and elimination of pest by producers who receive trainings during which they learn how to: (i) know crop pests and their natural enemies; (ii) know the mode of pest attacks and that of their natural enemies; (iii) assign a certain local description to cotton, to its pests and their natural enemies; (iv) learn to assess damages by pests and decide to intervene from a given threshold.

In Benin, the Farmer Field School (FFS) approach is the approach used by OBEPAB to teach farmers about physical pest control. FFS is a participatory training method which enables farmers to have a more comprehensive knowledge of farming practices. It enables farmers to learn through discoveries. That is, it helps them to learn and discover by themselves the existing relation between crops, pests, useful insects, soil and water. Farmers are trained during FFS, on the above points and are charged to extend the knowledge acquired in their respective villages.

For pest control, the new technologies adopted in the production of biological cotton are based on the development of local resources. Thus, in the area of phytosanitary protection, farmers use aqueous 'neem' seeds extract mixed with cow urine, garlic, pawpaw leaves extracts and traditional soap. Moreover, other farmers use local plants known as insecticide plants, and combine them with the aqueous neem seeds extract and other ingredients mentioned above for phytosanitary protection. Among these plants, there are *Khaya senegalensis*, *Tephrosia voeglii*, *Anonos senegalensis*, etc. Plant extracts with insecticide-like

effects are also used in the phytosanitary protection of market garden crops. Tests and research programmes are ongoing to strengthen their use in the control of market garden crops pests.

It is also recommended to farmers to use some plants considered as attractive to some pests. Thus, in the production of biological cotton, sunflower and the pigeon pea are considered as attractors of *Helicoverpa armigera*.

4.2.1. Management Approach in Public Health

In the context of the control of animate vectors harmful to public health, notably the malaria vector, various strategies have been implemented.

Indoor Residual Spraying

The Hygiene and Basic Sanitation Directorate (DHAB) of the Ministry of Public Health (MSP) conducted mosquito control in the city of Cotonou (in 1983, 1985, 1988 and 1994). Indoor treatments with Deltamethrin and in swamps with Malathion were executed. After these interventions, results showed a significant decrease in the frequency of mosquito bites (nocturnal capture).

Use of biolarvicides

The city of Cotonou is covered by large swampy areas that are flooded for more than four months in the year, and especially during the rainy season. These areas are the breeding sites for anophelines and culex. In these swampy areas, the incidence of malaria is higher. Moreover, the cesspools, open-air gutters, wells and cisterns are permanent breeding sites in big cities and especially in Cotonou. Faced with this issue and the appearance of resistance points of malaria vectors to Deltamethrin, an insecticide used to treat mosquito nets in Benin (see Monitoring Map of resistance in Benin in 2004), the Ministry of Public Health, through its relevant services, conducts experiments on biolarvicides by spraying *Bacillus thuringiensis israelinsis* (Bti) biolarvicides in the breeding areas in Cotonou, in order to strengthen the integrated vector control and plan additional strategies. The demonstrations that took place on pilot sites produced conclusive results. Just the day following the treatment of the breeding sites, all the larvae were dead. The biolarvicides experiments are ongoing to study the technical and financial feasibility of this additional approach.

4.3. Integrated management approaches in Guinea

4.3.1. Management approach in agriculture

The use of pesticides in agriculture in the Republic of Guinea, started in the 40’s and 50’s with expatriate farmers, in the context of the protection of export crops, particularly, pineapple, banana, mango, citrus fruits, coffee, and cocoa. As the years went by, this use was progressively diversified to be applied to cash and food crops.

The types of pesticides used in all the crops areas in the Republic of Guinea, are insecticides and herbicides in great quantity and fungicides, acaricides, rodenticides, growth regulators in low quantity.

Two approaches can be noted in the application of pesticides in agriculture in the Republic of Guinea:

- A first approach, more or less organized, with agricultural development projects and some groupings where pesticides application is done by Crop Defence Aids (CDA). "*A CDA is a Volunteer recruited among the members of a farmers' group to execute phytosanitary treatments on behalf of the grouping. To that effect, he should be approved by the State, train continually in good practices of plant protection in collaboration with the services of the Agriculture, Research and Extension Directorates".*
- A second approach with an organization system of individuals who have replaced plant protection agents. The interventions are henceforth executed by Private Phytosanitary Treatment Agents (PPTA) who are present in each prefecture of Guinea. *"A PPTA is an individual or a private enterprise, authorized by the State to execute phytosanitary treatment services. He should continually train in plant protection practices. He should assist farmers in identifying pests in their farms and execute remunerated treatments compliant with the principles of integrated control."*

The Pest Management approach in agriculture is focused on preventive and curative control operations as well as integrated control if need be. Different approaches can be used:

- Chemical control;
- Biological control;
- Agronomic/genetic/varietal selection control: use of pest-resistant or tolerant varieties and/or cultural control or cultural practices (weeding, tillage, rotation, selection of crop area, etc.);
- Integrated control (all the alternative control methods including chemical control).

There is also the experience in staggered targeted control in the context of the Kankan Cotton Project in the East and in the North of Guinea (Gaoual-Koundara). The basic principle of the STC is the use of reduced pesticides dosages as compared to the dosages used during the unsound calendar applications.

The agronomic/genetic/varietal selection control as well as the cultural control or cultural practice seems to be highly preferred by farmers. This choice is justified by the low availability of phytosanitary products which are relatively expensive.

The ownership of these various control methods is not effective among farmers, and the lack of impact studies, notably in the cotton area where high quantities of pesticides were used, is one of the weaknesses of the system.

Biological control methods

Biological control initiatives were developed from 1986, following a strong index of the cassava mealybug, *Phenacoccus manihoti*, the larger grain borer and the cassava green mite. Thus, the National Biological Control Programme of Guinea was created within the former Plant Protection Division with the scientific support of IITA and the technical assistance of GTZ.

The National Biological Control Programme of Guinea fits into the regional control programme of fruit flies in West Africa which is an initiative of the World Bank (WB), the International Institute of Tropical Agriculture (IITA) and the International Cooperation Centre of Agricultural Research for Development (CIRAD), an initiative financed by the WB and the European Union (UE). This initiative aims at enabling IITA-CIRAD to start disseminating in

mango-producing countries (Côte d'Ivoire, Senegal, Mali, Burkina Faso, Ghana, Guinea), monitoring and control methods of fruits flies (particularly *Bactrocera invadens*) developed in the pilot orchards in the north and central parts of Benin. This operational programme has helped to study a few pests and to breed and release a few natural enemies for their control. This programme intervened in the three natural regions of Guinea except for the forest part of the country.

These biological control initiatives have had good outcomes on the field. Five technical components in particular have been studied: the systematics of the main species of flies, the detection trapping, the current control methods, the control methods to be developed, the socio-economic components of the mango sector. The experiment with the larger grain borer in Middle and Lower Guinea was promising with the first positive results. The termination of the funding did not permit to proceed with sufficient breeding in laboratory.

The contribution of the current PGPP could be: (i) the continuation of the inventory of crop pests and the commodities stored as well as their potential natural enemies; (ii) the financing of breeding activities and release of pests' natural enemies; (iii) the formulation of a strategic vector control plan following the definition of the policy.

4.3.2. Management approach in Public Health

Vector control actions have been undertaken by the National Programme for Malaria control. They are limited, in practical terms, to the promotion of mosquito nets treated with residual insecticide.

There is a Sanitation service in the administrative regions that lacks the sufficient means for control. Its intervention is essentially limited to occasional treatments on public markets or upon request by individuals in homes. The APTPs also intervene in sanitizing buildings.

4.4. Integrated Pests and Pesticides Management Approaches in Liberia

4.4.1 Pesticides in Agriculture

The MOA renders pest control practices through its extension services by the extension personnel at the central and the rural offices. Most of the services rendered are by conducting training of trainers' workshops for MOA personnel, NGO personnel and community-based farmers. Also, agricultural institutions and universities trained personnel in pest and pesticide management. Currently, the MOA has adopted the Farmer Field School (FFS) approach by enabling farmers to serve as trained technicians in food production, marketing and pest management. Under the FFS, farmers are encouraged to adopt the use of botanicals in pest control. For the management of synthetic pesticides at field level, farmers are trained to handle the compounds with care by and through the extension service.

In addition, since the MOA lacks the human capacity and infrastructure pesticides are not handled, stored properly and managed. Storage structures for pesticides are not in place. Pesticides are generally stored in warehouses which house all sorts of materials due to inadequate knowledge by personnel on pesticide management. Even at the importer and small distributors' level, pesticides are sold by un-trained personnel. Many times, pesticide importers, distributors and public service workers in stores put boxes or cartons of pesticides on bare floors instead on shelves and pallets.

4.4.2. Pesticides in health sector

Regarding public health, pesticides management is handled by the MOH & SW. The personnel at the Ministry are mainly involved in public health sanitation and the environment. This goes along with vector control especially for mosquito control.

4.4.3. Experience of Integrated Pest Management (IMP)

Integrated pest management is a combination of physical, mechanical, cultural, chemical, biological control actions including the use of botanicals, with chemical application being the last option to reduce pest population during farm production practices. Agriculture technology to farmers is usually transferred by the MOA agriculture technicians. Some of the farmers have the knowledge of IPM practices but it is practiced at a low scale. Many times, the agriculture technicians are confronted with the request of pesticides from peri-urban and urban farmers. These farmers are mainly vegetable growers. Generally, most of the rural farmers do not request pesticide except fertilizers.

Currently, with the adoption of the Farmer Field School concept, many rural farmers have the knowledge of IPM practices as a result of the intensive training conducted by the MOA and the Food and Agriculture Organization of the United Nations (FAO). However, vigorous monitoring and evaluation needs to be carried out to confirm this.

Development partners and NGOs intervening in the agriculture sector may have trained farmers in IPM practices. On a general note, it is important to mention that most of the farmers, especially rural farmers, may not have knowledge in the use of IPM. The same may also apply to the extension workers who are generally crop technicians and not subject matter specialists.

4.5. Integrated Pesticides Management Approaches in Sierra Leone

4.5.1. Pest Management Approaches

The management of pest is part of the total crop production program, and refers to all pests including weeds, nematodes, pathogens, insects, vectors and vertebrates. The extension workers have been training small scale farmers over the years, to use various pest control methods and approaches such as:

Physical and mechanical control methods:

- Regular monitoring of pest populations combine with hand picking, digging of trenches, trampling to control caterpillars, armyworms and grasshoppers,
- Trapping and fencing -for insects and vertebrates in rice fields
- Scarecrows and Sling- for birds and rodents in rice fields
- Nets and hunting dogs

Cultural Practices:

- Ploughing – to expose grasshopper egg-pods, pupae and soil organisms to predators and sunlight.
- Crop rotation, fallow, use of healthy seeds, spacing, optimum plant population, and applying recommended agronomic practices,
- Rogueing, burning of infected plants, and heat treatment.
- Water management to control mole crickets, termites, and larvae of beetles.
- Resistant Crop varieties to control insects and diseases.

- Intercropping, early planting and harvesting – to control insects and vertebrate pests.
- Processing (sun-drying, smoking) to control insect.

Biological control:

- Use of parasitoids and phytoseiids
- Use of pheromones
- Use of biopesticides
- Lizards – to control insects.

Chemical control:

- Insecticides, Herbicide, Rodenticide, Nematicide and fungicide .
- Oils [engine oil, palm kernel-oil, palm-oil] to control snakes, black-flies, and fungi.
- Wood-Ash, Tobacco and Pepper- to control, beetles and storage insects.
- Seed treatment

Integrated Pest Management (IPM):

- Combining more than one control method to control the pest.

4.5.2. Pesticide Management in agriculture

For the Agricultural Sector, the Crop Protection Service is responsible to build capacity of farmers on pesticide management through training, with emphasis on: (i) the safe and effective use of pesticides, and (ii) proper use, care and maintenance of application equipment (iii) and storage and disposal of empty containers. The strategy of IPM, Agricultural Extension, and Land Use Policies should be addressed.

4.5.3. Pesticide Management in Public Health Sector

Information was not available on the management of pesticides in the public health sector during the mission. The Consultant visited the Malaria Control Program Office but the Manager was not available and those available in the project cannot or would not give out any information without being authorized by the Project Manager.

4.5.4. Experience of Integrated Pest Management

There is lack of adequate knowledge, skills, experience and capacity and therefore, needs training in these aspects.

4.6. Integrated management approaches in Togo

4.6.1. Management approach in agriculture

In the area of agriculture, maize and cowpea crops are speculations on which many pesticides are used ever since populations dropped cotton over the past years, following the heavy debt of farmers. However, market gardening also takes up an increasing scope in the use of pesticides. All sorts of formulations are used on these vegetable crops without control, and sometimes without the slightest knowledge about the basic practice or use of these dangerous products. Protection of post-harvest production is an area of agriculture in which pesticides are somewhat often used. It should also be noted that the intensification of rice production leads to the increased use of herbicides. The integrated weed control is also developed to the benefit of producers.

Regarding agriculture pesticides management, we could mention the former Togolese Cotton society (SOTOCO) which, in the absence of a national law restricting or regulating certain substances deemed harmful for humans and the environment, makes reference to FAO recommendations. Thus, since 1980, environmental concerns have been addressed in its research and selection and implementation strategies of cotton protection techniques. In a first phase, the approach enables to use insecticides while reducing the risks. Organochlorides have been abandoned to the benefit of organophosphorous. The number of applications per crop and per year has decreased from 9 to 6. The second phase uses an approach that consists of using only third generation pesticides known as biodegradable pesticides: these are pyrethroids. SOTOCO also instituted a continuous training programme for supervisors and farmers, and established a monitoring programme on the field in order to ensure compliance with the guidelines provided.

Some NGOs play an important role in educating and sensitizing the public, notably to reduce the use of insecticides, the use of traditional conservation and control of pest, chemical pesticides-related pollution. However, their interventions are limited due to the lack of sufficient information on the management of chemical products and also to the lack of resources.

4.6.2. Management approach in Public Health

In the area of public health, many pesticides, and even the most harmful (POPs: Dieldrine, Aldrine, DDT, etc.) were used in vector control activities. Current cases of DDT use are possible in market gardens where market gardeners have claimed to have used it after acquiring it from traveling merchants coming mainly from neighboring countries.

Indoor spraying was executed in the framework of malaria control, but only the vector control aspect, based exclusively on the distribution of treated mosquito nets, was executed with some success. Nevertheless, there are efforts in the area of research and mapping of the resistance in Togo, notably in the inventory of mosquito species, the monitoring of mosquitoes sensibility to insecticides and the characterization of resistance mechanisms to insecticides for an improved participation in malaria control. This trend of adopting integrated control strategies combining two or more methods, should be reinforced (use of MILDs strengthened through indoor spraying; search for a new version of, or more efficient versions of MILDs that integrate the vector's poly-resistance to the various insecticide classes; etc.).

There is also the use of pesticides for the packaging of food products and for agro-food treatments.

4.6.3. Integrated Control Methods

Integrated control aims at combining all the possible and practical pest control methods. It includes the trapping, the best product of the plantation, the biological control and the sound use of pesticides.

Chemical control

In the early 1970s and following the examples of other countries across the world, Togo restricted the use of persistent pollutant organic pesticides, one after the other. Organochloride pesticides were gradually replaced with organophosphorous and synthetic pyrethroids. However, the appearance of *H. armigeri* resistance to synthetic pyrethroids has required the dissemination of new treatment programmes including Endosulfan, Indoxacarb and organophosphorous insecticides.

Experiences in integrated control
In the area of integrated control, initiatives have already been carried out by ICAT: training of agents on the Integrated Pesticides and Predators Management (GIPD); and experiments conducted on the field in relation with SOTOCO.

The use of chemical pesticides is replaced with entomologic natural plants obtained free of charge by farmers, such as neem (*Azadirachta indica*), *Lannea microcarpa*, red pepper, cow dung, etc. which are used as natural pesticide. ITRA also initiated experiments on the use of biological pesticides (neem extracts or *Azadirachta indica*) on market garden crops. Nevertheless, some constraints emerged during the purification of the molecule extracted from neem. Other promising tests have also been conducted from pawpaw leaves extracts.

The essential oils produced from the local flora aromatic plants and their components, as well as the neem seed oil, have, as compared to arthropods, lethal and sub-lethal actions (repulsive effects, anti-feedant and inhibitors affecting insects' fecundity, molting, growth and development).

Maize and Prostephanus truncatus
Biological control: the natural predator *Teretriosoma nigrescens* (Beetles: *Histeridae*) has been introduced into Togo. Results were obtained in Togo where there was 80% of predation. These encouraging results lead to hope for the breeding of *Teretriosoma nigrescens* and its release in nature to control *Prostephanus truncatus* in Togo. The combination of chemical and biological control of *Prostepbanus truncates* should be reinforced in view of their complementarity.

Other biological pest control programmes have been implemented such as the cassava green mite *Mononychellus tanajoa*, the cassava mealybug *Phenacoccus manihoti*, the mango mealybug *Rastrococcus invadens* and the white fly *Aleurodicus dispersus.*

Biological control experiments on cotton
Regular biological control experiments of the cotton moth have been disappointing. However, the use of microbial agents formulations (polyhedral nucleus vector) mixed with some low dosage pyrethroids (1g deltamethrin ingredients and 4g cypermethrin active ingredients/ha) produced very encouraging results in Togo.

Togo also currently experiments with a pesticide-free cowpea storage process in the context of a project entitled Purdue Improved Cowpea Storage (PICS) without chemicals. The project is currently opening and assessing the sacks, and preparing the end-of-experiment report.

Box 1: Biopesticides production techniques in Togo

Biopesticides production techniques in Togo

The methodology used to obtain biopesticides from neem is described as follows :

- Grind 1kg of well dried neem seeds;
- Pour the powder obtained in a container and add 10 litres of water. Cover and keep in the shade for 1 to 3 days;
- Carefully filter the mix. On the day of the treatment, finely grind 20 freshly plucked pawpaw leaves;

- Mix the ground leaves in 1 litre of filtered water;
- Mix the pawpaw leaves solution with the neem solution;
- Add 1 litre of fermented cow urine and 20 g of traditional soap mixed in a little water;
- Put the product in an ULV Sprayer and treat a 1-hectare farm;
- Repeat the treatment 6 to 7 times in one season.

5. PESTICIDE MANAGEMENT METHODS AND USAGE

5.1 Management methods in Benin

Pesticide management is mainly the responsibility of the Ministry of Agriculture, Livestock and Fisheries through the service for plant protection and phytosanitary control. Pesticide management is done through actions under laws and regulations governing the registration, importation and exportation control, distribution, transportation and use of phytopharmaceuticals. In comparison with the previous chapter, there are many steps in terms of pest and pesticide management.

The establishment of pesticide management is based on laws and regulations appointing competent bodies in the management of phytopharmaceuticals. This legislation, namely the 1991 Phytosanitary Act, which always serve as a reference has not seen major changes since its establishment. For this purpose, it can be noted that the Phytosanitary regulation Act in the Republic of Benin is in harmony with the current regulations at the level of CILSS. One may for this purpose convene article 19 of the said law stating a registration « valid for 10 years and renewable for a period of the same duration » meanwhile this is not the case in the CILSS regulations.

One of the strongest areas of focus of pesticide management in Benin is on phytosanitary supervision on the national territory. Thanks to financial technical partners, particularly GTZ, « the capacity building project» from 1981 to 1998 helped to establish a strategy based on staff and producers training, followed by start-up activities of the plant protection department. This start-up activity is marked by the production and dissemination of the phytosanitary inspection material, developed in 1995 with the support of GTZ as part of the abovementioned project. This guide covers in particular, inspection and control procedures of imported and exported plant products. Developed since 1995, this guide needs to be re-updated by relying on new arrangements that will be made at the level of the 1991 Phytosanitary Act.

Supervisory activities are carried out primarily at the borders concerning the importation and exportation of plant and phytopharmaceuticals. Nevertheless, coverage of border control posts is not complete, five posts are not covered at all and the number of those covered is not complete except for those of Cotonou port. The internal supervision at the community level is also low insofar as SPVCP is not able to fully cover the country’s 77 communes, only 48 communes are equipped with a Community Phytosanitary and Plant Protection Agent.

Plant protection and pest control constitute also an important step in pesticide management. It is essentially based on human, material and financial resources. In terms of human resources, the current context of SPVCP is characterized by:

- A very low availability of personnel at the Directorate for Agriculture. The service does not have enough technicians to ensure full-time supervision of guards during treatment activities;
- A lack of synergy with agents of Cerpa Directorate General, plant production advisors, expert technicians in plant protection, ACIPPV, agricultural producers etc.

Financial resources are more and more scarce limiting the scope of intervention against pest. Pest control activities and other plans of action particularly against rodents and granivorous

birds developed and implemented by the plant protection and phytosanitary control service in Benin do not present factors that take into account chemical products effects on physical, biological environments.

It should also be considered that among the personnel of the service and its divisions there is none with an environmentalist profile.

The technology transfer process is provided by the Directorate for Agricultural Council and Operational Training (DICAF). It effected the production of a huge number of fact sheets and reports on good agricultural practices in Benin deriving mainly from development research findings. These sheets and reports were developed based on a business approach (poultry farming production, fish farming, etc.). Among these tools, the LEC report enables to take into account the application of synthetic chemical pesticides in good agricultural practices. Thus, the conditions for achieving effective treatments to help protect treated cotton crops by reducing the quantity of pesticides are proposed through the LEC. However, actions that contribute to avoid phytotoxicity problems are not clearly identified and described in this report.

Moreover pesticide residue management in agricultural farming using this technology is not treated. This sheet was translated into local language. In this Directorate, a clear strategy proposing areas and accompanying measures needed for the promotion of good agricultural practices. This is all the more so true as the majority of good practices taken stock of are not much used by many actors among which are producers, due mainly to the fact that they are meant for technicians and advisors in plant production and are not often translated in local languages.

There is no pesticide management integrated approach between the various ministerial structures involved. This is certainly due to an institutional silo.

Concerning agricultural research, INRAB integrates the consideration of pesticides in research activities through particularly, the study of pesticides used effects in soil, harvested produce, fauna and flora species experiments. However, it must be noted that it is the responsibility of teams to master research themes, concerning the effects of products used on research subjects but also of existing scientific linkages between experiments carried out as part of INRAB research programmes and not of the integration of an environmental dimension in research activities The Laboratory for Crop Protection (LDC) of INRAB carried out tests with farmers for pesticides registration by CNAC.

It should be noted that the lack of check points for fraud and on agricultural inputs, expose agricultural producers to dangers without guarantee for compensation. Moreover, the low level of technical skills of operators, highly due to illiteracy among the majority of the rural population in Benin contributes to a bad inputs management, particularly phytosanitary products whose bad use can lead to disastrous consequences. For example, some maize producers use cotton insecticides to treat maize stocks “spath”. SPVCP leads awareness campaigns for producers with limited means and resources so as to stop them from using cotton insecticides for a post harvest treatment of maize. This action, to be effective and sustainable should be followed by the alternative formula proposal by INRAB.

5.2 Management methods in Guinea

It appeared that approaches, phytosanitary practices strategies put in place in the Republic of Guinea will depend on actors considered: big development projects, big producers who have financial means use chemical control (preventive and curative) at the expense of all other forms of control. While the majority of small producers who do not have consistent financial means continue to practice cultural and agronomic control.

It should be made clear that these crop and agronomic control methods have not been subjected to an in depth investigation for their analysis and possible extension. It should be stressed that there is a low rate of phytosanitary products use by producers and in local populations farms.

Their use is relatively limited for various reasons:

- The low financial capacity of producers in agrochemicals supply;
- Low available quantities on the national market;
- The subsistent nature of small-scale farmers cropping systems;

Nevertheless, with a declared desire to achieve an agricultural intensification in certain areas including on one part rain rice cultivation, hillside dry rice cultivation, low-land rice cultivation, valley rice cultivation on the other part vegetable production and off-season crop opportunities, it is certain that this increased opportunity of production will increase the needs of peasants/farmers/producers in agrochemicals, fertilizers to maintain the fertility of intensively farmed sites; of pesticides to protect vegetables that are most fragile or sensitive to insects, and pesticides to counter-attack the increased infestation of a plot due to monoculture or repeated vegetable crops rotation.

Producers with few spare resources use agrochemical products incorrectly, without protection and appropriate equipment or through defective dosage or applications. Indeed, it appeared that unfortunately in Guinea, producers do not have the required knowledge for a judicious use of pesticides for an effective protection of their crops and stocks, while providing safety for consumers and the environment.

It is important to stress that the reasonable use of phytosanitary products in conjunction with a large range of improved agronomic technologies (including integrated insects management) will eventually be a management strategy that should be more disseminated.

Regarding pesticide storage, there are no pesticide storage warehouses in compliance with FAO standards. The stock detained by SNPV is conserved in a container which is left on SNPV premises. In addition, pesticide stocks detained by big producers and development projects are often done under conditions not complying with FAO set standards.

The use of the mushroom-based bio-pesticide Green Muscle, *Metarhiziumanisopliae var. acridum* is not yet effective in the Republic of Benin.

Concerning disease vector control, the new national hygiene service which is being established has many active projects with the most important which are:

- finalization and adoption of national public hygiene policy paper;
- holding of a collaborative meeting on anti-vector control to define the roles and responsibilities of all actors involved in the sector;
- training of actors on anti-vector control;

- assessment of products used in the anti-vector control for registration;

The most urgent need is the development of a strategic plan for anti-vector control following the definition of the policy.

It emerges from this that major problems associated to pesticide management in agriculture and human health are:

- Non-existence of crackdown measures on fraud;
- Non-existence of national LMR and pesticide residue analysis in and on fruits as well as vegetables for local consumption;
- The non-mastery of impacts caused by pesticide use on the most fragile ecosystems.
- Lack or even scarce impact assessments related to pesticide use ;
- Accidents related to the non-compliance of recommended standards for pesticide use
- Concerning public health, some cases of poisoning have been reported, related to a re-use of packaging that contained pesticides for drinking water, oil, palm wine and rattan wine conservation;
- Non-existence of pesticide storage and transport infrastructures in compliance with FAO standards;
- The low capacity of the service to deal with pest invasions (legion caterpillars, locusts etc.).

A particular attention should be paid to defining a strategy to fight vector transmission diseases by combining preventive and curative measures including anti-vector.

5.3 Management methods in Liberia

There is no proper management of pesticide in Liberia due to the lack of pesticide management, as it lacks legislation for regulation, supervision, monitoring and enforcement activities. This process has resulted into many outdated and banned pesticides being sold in the market. The problem is exacerbated as many distributors by-pass the system to bring into the country pesticides without going through registration procedures and screening. This process has resulted into many pesticides being found in the market that are banned and outdated. Since there is no regulatory system in place such as legislation enforced by inspection, supervision and monitoring, and measures for violation, it is worth mentioning that pesticides management is non-existent in the country.

Currently, the MOA is unable to provide a checklist of the quantity of pesticides brought into the country at a certain period of time. Also, there is lack of information on the categories of pesticides available which are environmentally safe, banned or outdated. Moreover, it is difficult to ascertain the number of wholesaler and retailers of pesticides. The result of this is that, the MOA lacks the structures, policy and legislation, capacity and functionaries to implement pesticide management.

The MOA and the EPA have begun the process of maintaining a list of pesticides being imported into the country. However it is still difficult to ascertain the number of wholesaler and retailers of pesticides.

In the country, pesticides storage structures are not available to maintain the compounds in good shape for a better shelf life to enhance their potency. Generally, warehouses of all sorts are used to store and keep chemicals. Sometimes, improper storage leads to leakage of the

pesticides due to high temperatures especially when the compounds are stored in iron containers as it is commonly practiced.

5.4 Management of Pesticides in Sierra Leone

The management of pesticides falls under the purview of the Department of Chemical Control and Management of the EPA. The Chemical Control and Management Department should collaborate with the Ministry of Trade and Industries but this is not taking place for the importation of chemicals. The processes for the importation of pesticides are as follows:

- The EPA reviews the application and either approve or reject the application. If approval is granted, an import permit will be issued.
- The Ministry of Trade (MOT) approves the importation with fees to be paid.
- NRA collects the revenue for the importation from the Importer.
- The pesticides known as Persistent Organic Pollutants (POPs) are not imported hence the country has ratified the Stockholm Convention.

The Ministry of Agriculture does not import pesticides but purchase its requirements through the Importers/Suppliers and is responsible for the management of the pesticides purchased, as the most competent institution. The role of Crop Protection Service in the procurement and management of pesticides is to prepare a list of pesticides required and MAFFS will tender and Importers/Suppliers will supply the requirements.

The pesticides are verified on arrival and stored properly. The users [small-scale farmers] are trained on the safe use of pesticides. According to the Crop Protection Unit there are expired stocks piles of pesticides in MAFFS stores at district levels. However, the types and quantities of the expired pesticides stocks are not known and there is need to quantify them including their storage conditions.
The Importers are not adequately trained and lack proper storage facility. Furthermore there is no quality control system. .

The EPA has a total of seven technical staffs and the Department of Chemical Control and Management has only one staff with a Masters Degree. There is need to recruit and train more staffs to monitor the importation and judicious use of pesticide, storage and disposal, sensitization and awareness creation to protect human health and the environment.

5.5 Management methods in Togo

Togo does not have pesticide production facilities but is a user country of the latter for crop phytosanitary protection as well as anti-vector control.

In general, the biggest users of pesticides in Togo are the cotton sector (ex SOTOCO), the coffee and cocoa sector, vegetable and to a lesser extent the cowpea and maize conservation sector. The increase of pesticide needs will be determined by the development of activities in the whole of these various sectors.

The Pesticide importation route in Togo is not well mastered. Therefore, it is not possible to know the total amount of imported pesticides in the country. Togo’s geographical situation makes it a final and end-use market and/or transit point for various products of often dubious characteristics. This situation is encouraged by: the high permeability of borders; ignorance of

populations of certain products with highly and extremely dangerous active ingredients; access to low cost of these products as compared to registered pesticides; non-availability of approved pesticides everywhere.

The Order No.30/MAEP/SG/DA of 24th September 2004 banning the importation and use of methyl bromide in Togo (BrCH3). The Order 31/MAEP/SG/DA of 24th September 2004 banning the importation and use of organochlorines in Togo (Aldrine, Endrine, Dieldrine, DDT and its derivatives, Mirex, Toxapene, Hexachlorrocyclohexan, Chlorane, Heptachloride), recognized as hazardous pesticides on human health, animals and the environment. A draft list was drawn by CPP concerning 84 phytopharmaceuticals that are registered or have received a provisional sales authorization (between October 2004 and January 2008).

At the national and local level, community structures do not have in general appropriate warehouses for pesticide storage. At the populations' level, the storage system is not in compliance. Indeed, it can happen that products are stored in rooms, in a corner of the house, in non-identified containers with all risks pertaining to this practice particularly in the use for food for infants as well as adults.

Plant protection services at the MAEP level are responsible for monitoring distributors to ensure that only registered products are available to producers.

Packaging is either buried or burnt or there is no management and disposal system of empty packaging and residue of phytosanitary products. Most packaging are scattered on the ground and are sometimes recycled for domestic use.

It is noted that the use of pesticides intended for cotton farms in the field of vegetable farming according to vegetable farmers own terms who behave as such by ignorance. This is why Endosulfan, a dangerous pesticide presenting the same characteristics as POPs, is currently used in vegetable farming. Other vegetable farmers use DDT from Ghana for treatments in case of increased pest resistance.

5.6 Synthesis of pesticide management in targeted countries

5.6.1. Stock-taking of pesticide commercialization

In all countries, the distribution and trade network of pesticide is based primarily on informal sale and very few professional private structures are accredited in this activity. Controls carried out by plant protection services on the marketing of these products are insufficient, even non-existent due to a lack of staff and means.

Thus, a great majority of dealers and storekeepers in the sector sell products in an uncontrolled, anarchical and unauthorized manner in public places. This constitutes a danger for producers, dealers and populations. The informal trade sector needs to be supported, regulated, organized, monitored and controlled (for example: regulation improvement; training and awareness-raising of dealers and building of their capacity for a professionalisation of sales (assistance in acquiring authorized and accredited stores; reinforcement of monitoring and control methods of OPV and DNA inspectors to enable them carry out their duties correctly) ; etc.

5.6.2. Quantitative and qualitative assessment of pesticides used

In all countries, it is difficult to obtain complete statistical data on pesticide consumption. For the consumption of pesticides in the public health and animal sector and domestic use, no trend can be drawn. The absence of data bank on pesticide management is a major source of constraint and the lack centralized statistics does not enable to follow its evolution and its main actors. Qualitatively, there are no infrastructures required to carry out this control (formulation control, residual analysis, etc.).

5.6.3. Pesticide use

Product storage

Services managing pesticide as well as agricultural producers do not generally have appropriate pesticide storage facilities. At the populations' level, the storage system is not in compliance and this exposes populations especially children to poisoning risks.

Obsolete pesticide management and empty packaging

Pesticides can become obsolete in case of prolonged unused stocks available in the country. Moreover, the prolonged storage of pesticide can cause leakages and contaminate soil, water and storage zones. A safe destruction of these obsolete products requires huge financial means and high technologies. Concerning empty packaging, in general, they are disposed off in the wild anarchically: either the packaging is buried of burnt, or there is no management and disposal system available. Sometimes they are used for household purposes with all the risks they entail.

Used and registered products – Risk products and banned products

Benin, Guinea and Togo have a list of authorized and banned products, which is not the case in Liberia and Sierra Leone.

5.7 Negative impacts of uncontrolled use of pesticides

When a system/body is exposed to a pesticide, the manifestation of the pesticide toxicity occurs. Toxic products produce effects on the body from the moment they are absorbed, mainly on the skin, the digestive system and on the lungs; toxic products effect on the body

are caused by concentration in targeted organs. Foreseeable risks are related to the following steps: product storage; handling; transportation ; dosage during treatments particularly contamination of field agents (applicators) who could be exposed to pesticide effects if instructions related to product utilization standards are not sufficiently applied; use of grazing areas right after treatment, if the populations are not sufficiently informed and associated to preventive control. Major risks in the areas where traditional pesticides should be used are the following:

Table 2 Negative impacts of uncontrolled use of pesticides

Environment	**Nature of impact**
Soil	• Modification of the microbial flora • Pollutions
Surface water	• Pollutions • altered pH
Well water Water-tables	• Pollutions : • Altered pH
Air	• Air pollution
Biodiversity	• Pest chemo-resistance • Fauna poisoning • Poisoning and mortality • Manpower reduction and/or biomass • Extinction/Proliferation of species or group of species • Breakdown of the food chain • Loss of biodiversity
Human health	• Intoxication : Alteration : o of the embryonic development o of population growth o of reproduction • Poisoning • Death • Drop in cholinesterase level

Intrinsic dangers for each pesticide can be based on five toxicity measures representing various risk factors:

- Acute oral toxicity for the rat; general poisoning risk for human;
- Acute skin toxicity for the rat: occupational hazard for pesticide operators (professional applicators, farmers, formulating plants workers);
- Acute toxicity for fish: risk for fish and fishing;
- Oral toxicity for the bird; risk for birds;
- Acute toxicity through contact for the bee: risk for bees, pollinization of crops and honey production.

5.7.1. Population at risk

Risks occur during:

- Pesticides application (for land applicators, pilots, drivers and machine manipulators);
- Transportation (contamination of containers, tank bursting or spillage);
- Monitoring during treatment activities or prospection.

Risks affect:

- ***Field agents***:
  These are people (researchers, supervisors) involved in treatment activities and who are more exposed but, it is important to point out that all other agents can be in danger.
- ***Populations:***
  During treatment activities after treatment, empty pesticide containers.

5.7.2. Adverse effects on the environment.

The use of pesticides entails a certain number of disadvantages and adverse effects among which are environmental pollution and risks of intoxication often justifying the need of abandoning the method and resorting to other natural protection measures. Pesticides pollute water and air, destroy the fauna and dangerously modify the function of the ecosystem.

Adverse effects exist on the soil, in the air and on waters in terms of: (i) mortality on non-targeted species fulfilling important ecological functions: bees and other pollinizing agents, natural enemies of certain pests (parasites, predators, pathogens) ; (ii) pollution during space treatment of parks and natural reserves, fishing and livestock production zones with the contamination of fauna and flora; (iii) water pollution either directly or through surface water : (iv) resistance among insect populations.

5.7.3. Impact on health and causes

Phytosanitary products intended for pest prevention and control as well diseases in agricultural production have proven to be harmful to humans and their environment. Thus, it is noted that warehouses for phytopharmaceuticals are: set up on inappropriate geographical space unit (in the middle of built-up areas); built without respecting conventional norms (without holding tanks, without cesspit and fire hydrant); ill-ventilated not well lit up.

Moreover, individual protection measures and recommended dosage are not respected. Phytopharmaceuticals cause in rural areas especially in cotton and animal production zones burns, human poisoning (nausea, vomiting, dizziness, coma, death).

5.7.4. Pesticides-related accidents

Important quantities of obsolete pesticides constitute major risks weighing on human and animal health as well as on the environment. Storage conditions of this toxic waste are most often precarious.

5.7.5. Synthesis of impacts and risks of pesticides management methods

Table 3 Pesticide management methods and associated risks

Step	Influencing factor	Risks		
		Public health	Environment	Personnel
Transportation	Lack of training Inadequacy of transport Emergency preparedness planning		Accidental discharge, water-table pollution through leaching	Product inhalation : vapour, dust, risk of skin contact Skin and eye contact
Storage	Lack of means Deficit in pesticide management training Inadequacy of facilities	Accidental contamination Inconvenience of populations living in the vicinity	Soil contamination	Skin contact through accidental spillage caused by the narrowness of the premises Skin and eye contact
Handling manipulation	Deficit in training and sensitization	Contamination of water sources through washing of containers Accidental leaks	Soil contamination through accidental spillage or intentional discharge, water-table pollution	Vapour Inhalation, skin contact through splashing during preparation or product transfer Skin and eye contact
Packaging disposal	Deficit in training, education and sensitization Non availability of disposal facilities	Product ingestion by re-using containers		Skin contact and respiratory tract Skin and eye contact
Washing of containers	Deficit in training, education and sensitization	Skin contact, contamination of wells	Acute intoxication of fish and other crustacean, pollution of wells, ponds, water-tables	Skin contact Skin and eye contact

5.8 Assessment of knowledge and practices in pesticide management

At the technical services level (Research Institutes, Ministries of Agriculture, Ministry of health, Ministry of Environment, etc.), knowledge in terms of pesticide management is relatively well mastered. On the other hand, among users, especially traders in the informal sector and uninformed populations, the needs for information, training and sensitization on regulatory procedures, products characteristics and good implementation practices are. Most users (in agriculture as well as in health) ignore the adequate and relevant use of pesticides particularly the various alternative methods within the integrated pest management framework. Capacity building concerns particularly training on pesticide use and alternative methods to better advice on anti-vector control

Moreover, protection and safety measures are generally precarious, that is why the control and standardization of warehouses and pesticide sale becomes necessary so as to avoid or at least reduce the population’s exposure to these products.

6. ASSESSMENT OF THE IMPLEMENTATION OF EXISTING PPMp

6.1 Assessment of the implementation of existing plans in Benin

Action plans developed by the national competent authority in terms of plant protection and phytosanitary control, i.e. the Plant Protection Service are in reality, field intervention arrangements through pest control campaign. The objectives of these plans are often reduced due to a lack of financial and human resources. Projects and programmes particularly, capacity building project had a made a one-off support that helped to establish the true foundations of a phytosanitary supervision strategy of the national territory, plant protection and pest control. It should also be noted that the activity of many organizations and non-governmental bodies concerning the achievement of pesticide and pest management action plans remains localized in their intervention zones, for example we can mention:

- FAO is in collaboration with MAEP to validate the counting of residual stocks of Endosulfan and to proceed to their elimination with the appropriate accompanying measures.
- The Programme for Integrated Management of Pests and Pesticides (IMPP) which takes into account soil fertility management and a slight use of pesticides
- Projects and programmes of various ministries assisted by equipped private and national laboratories with a qualified staff in the identification of possible harmful effect on populations' health and environment.

Some agricultural programmes such as the Emergency Food Security Support Programme have specific measures and action plans relevant to pest control and pesticides management. However, the lack of budget in respect of these measures did not allow their implementation.

From the operational point of view, human resources are lacking at the regional level with few Plant Protection Senior Technicians among staff.

The research does not roll out a specific Pest and Pesticide management programme; however INRAB is responsible for environmental concerns with research activities for the registration of phytopharmaceuticals. Works done in the Laboratory for soil, water and environmental Sciences are in charge of integrated soil fertility management.

It did not appear in the assessment, pesticide and pest management plans and programmes by the concerned services, but rather actions mainly concerning the dissemination of reference documents such as instruments and laws, guides and technical data sheets to major users namely agricultural producers, processors and other users of the research findings.

6.2 Assessment of the implementation of existing plans in Guinea

Currently, there is no program that has or implements a Pesticide and Pest management Plan. The national service for plant protection is relatively young and that is Guinea must be registered in the WAAPP, in the support for the development of pest and pesticide management plan in accordance with FAO plan and countries that have it.

6.3 Assessment of the implementation of existing plans in Liberia

Currently, there is no definite pesticides management plan being conducted at the Ministry. Whatever that is being practiced for regulatory purpose is just an ad hoc arrangement which indicates the lack of capacity.

6.4 Assessment of the implementation of existing plans in Sierra Leone

Currently, there is no Pesticide Management Plan. The system in place is not adequate and should be redressed urgently and establish a proper Pesticide Management Plan that will protect human health and the environment, as well as enhance compliance with World Bank Safeguard Policies. The Crop Protection Unit which is under the Director of Crops Division is very weak and lacks the capacity.

6.5 Assessment of the implementation of existing plans in Togo

Togo does not have a national plan for integrated pest management, however, various strategic links of diagrams are used to combat pest. Programmes such as the Community development Project (Ministry of Cooperation, Development, Town and country planning financed by the World Bank) have integrated a mini pest and pesticide management plan of an amount of FCFA 50,000,000 to support the implementation of activities. Proposed measures are focused mainly on the following activities: Implementation of a Monitoring Committee (coordination and follow-up); capacity building of regional and local structures (CVD training); Organization of training for users (farmers, private, NGO); Sensitization of populations; Reinforcement of pesticide control; Provision of equipment and pesticides storage and management infrastructures; Protection of personnel and populations; Monitoring and Evaluation.

Table 2: Community monitoring project of pesticides

The Department of Environment initiated the Community Monitoring project of pesticides in area with strong cash crops, vegetable and food crops farming in Togo (example of the Central region with an amount of F CFA 34,022,300) to help Togo do a pilot diagnostic in the central region so as to identify pesticides that are posing health and environmental problems under the conditions they are used. The overall objective is to contribute to community health and environmental protection through the establishment of a local self-monitoring system of pesticides. The specific objectives are:

- Possess reliable data on pesticides that are posing health and /or environmental problems under their conditions of use;
- Build the capacity of actors (local communities, and other stakeholders) on pesticide monitoring techniques and the Rotterdam convention;
- Sensitize on dangers related to the use of hazardous pesticide formulations and promote available ecological alternatives;
- Promote the regulation on pesticides that are posing health and environmental problems (ban usage and commercialization in Togo and request the inclusion in the PIC list by Togo).

The following key results are expected from the project

- Reliable and consistent data on negative impacts of hazardous pesticides formulations on the health and environment are available and published;
- The capacity of actors is built;
- Pesticides self-surveillance devices are put in place in each district of the central region;
- Local actors involved in pesticide management are aware of dangers related to the use of hazardous

pesticides formulations and available ecological alternatives promoted in the region;

- National regulation on hazardous pesticides preparations exist and are operational;
- Proposals on extremely hazardous pesticides preparations are submitted to the Convention's secretariat.

7. ACTION PLAN FOR PEST AND PESTICIDE MANAGEMENT

7.1. Priority issues identified

The following issues and constraints have been identified as part of the pest and pesticide management:

Plans and programmes level

- Non-existence of specific and quantified action plans or programmes in terms of Pest and Pesticide management

At the institutional, legislative and regulatory level

- Lack of and/or inappropriateness of the regulation related to the sector.
- Lack of coordination in actors interventions;
- Lack of organization on the part of producers in acquiring products;

Actors capacity and populations awareness-raising level

- Lack of training for agricultural producers on pesticide use;
- Lack of information to populations;

Pesticide technical management level

- Non-existence of reliable data on pesticides;
- Non-existence/inadequate product storage facilities;
- Timid experiment of alternative methods to pesticide and integrated control;
- Non-existence of effective waste treatment and disposal systems.

Monitoring and control level

- Lack of control in terms of product use (staff and equipment) ;
- Non-existence of control and monitoring of pesticides-related adverse effects (pollution, poisoning, etc.);
- Absence of functional laboratories for the analysis of LMR

7.2. Strategy of intervention and pesticide management action plan

The assessment objective for the implementation of WAAPP 1-A's PPMP (in November 2009) enabled identify several deficiencies and identifiable causes at several levels: (i) lack or even absence of sharing and dissemination of PPMP; (ii) lack of synergies with other programmes or current or future pesticide management activities in the countries ; (iii) absence of clear specific expectations or responsibilities of each category of actors; (iv) absence of differentiation between the research phase and the extension phase. Thus, to reverse these negative trends, this PPMP will be registered in a logical rupture in moving towards the following areas of intervention (at the strategic and technical level):

7.2.1. Strategic guidelines of the PPMP

- Clarify institutional expectations and responsibilities so as to have a PPMP in which all actors are involved.
- Ensure the effective participation of all concerned actors (Health; etc.).

7.2.2. Technical guidelines of the PPMP

The current PPMP should take into account two major concerns: (i) pesticide management needs in research management and (ii) needs during the extension phase.

7.2.3. Principles

WAAPP 1- C's intervention in the field of plant protection and pesticide management should focus on the following principles:

- Principle of precaution and attention
- Capacity building of actors in pesticide management
- Transparency and traceability of products used
- Sustainable management of products and Public Health approach
- Coordination and inter-sectoral cooperation
- Development and reinforcement of technical norms and standards
- Information and management of data related to pesticide management
- Rationalization and strengthening of supervisory structures and risks prevention
- Monitoring and evaluation – environmental and sanitary impact control
- Integration of integrated management in extension/information systems for producers

7.2.4. Action plan

Essentially, in each targeted countries, the action plan is centred on the following areas:

SE/CORAW/WECARD

Control, monitoring and supervision:

- Workshop on scaling-up at the sub-regional level
- Support to the establishment of national data banks
- Monitoring system of pesticides poisoning
- Monitoring/Evaluation (periodic; mid-term and final evaluation) of PPMP

Benin

At the technology dissemination level, initiatives of Good agricultural practices, in other words, the use of agricultural techniques that minimize risks, maximize production whilst ensuring human safety, should be capitalized and developed in the form of a practical guide. It will be left to disseminate on a large scale and to assess the impact of this dissemination on the sustainable management of natural resources. Key actors must be identified and benefit from building their intervention capacity so as to facilitate ownership of these tools.

The law on phytosanitary regulation in the Republic of Benin, which serves as a reference for the Pesticide and Phytosanitary control Service and on which the concerned services rely for plant sanitary protection, dissemination and extension of appropriate techniques in terms of phytosanitary protection, accreditation organization and the importation control as well as marketing etc., passed in 1991 should be subjected to compliance particularly in the area of provisions its implementation with the regional legislation.

<u>Legal and institutional capacity building:</u>

- The first concerns the Phytosanitary law in the Republic of Benin. Passed after more than 20 years, it must now be re-updated and improved through particularly, decrees and orders so as to be in compliance with the legislation proposed by CILSS;
- A workshop by the services of the ministry particularly DICAF and SPVCP on the ownership of the Pest and Pesticide Management Plan;
- Environmental cells must also be reactivated in ministries where they are in a state of lethargy;
- Make the supervision and early warning system network functional
- In each of the structures involved in the implementation of WAAPP project activities, socio-environmental focal points must also be appointed and given the ability.

Technical measures:

- Instruments deriving from the law such as the plant protection inspector's manual and guidance draft document on fertilizer control developed by the early warning system and phytosanitary interventions department and used by the Ministry's agents in the exercise of their regal function should be re-updated after harmonizing the provisions made in the 1991 Phytosanitary Act;
- It also important to support the capitalization and dissemination process of good agricultural practices, to identify forms of partnership to be developed, to define the roles of stakeholders in the promotion of good practices and to assess its impact on the sustainable management of natural resources;

Training:

- A capacity building of the plant protection service agents at the national level particularly, at the level of the early warning and phytosanitary intervention department in charge of coordinating all interventions of the national territory;

Control and Monitoring:

- Strengthening of monitoring and follow-up measures at all levels (borders, users, use, residual management and expired products, etc.)

Republic of Guinea

Legal and institutional capacity building:

- Organize a workshop on information sharing and extension of PPMP
- Support the development of a national plan on pest and pesticide management
- Set up regional brigades to fight pandemics;
- Renovate phytosanitary antennas;
- Build the operational capacity of researchers, Plant Protection Services agents and health agents.
- Renovate phytosanitary antennas of IRAG and the national service for Plant Protection;

Technical measures:

- Continue the inventory of crop pest and stored foodstuffs as well as their potential natural enemies;
- Define and put in place a strategy and methods to combat major pest;

Training/sensitization –Capacity building:

- Build the operational capacity of Plant Protection services agents and officers;
- Ensure the technical training of Phytosanitary Treatment Private Agents (PTPA) and Auxiliaries for Crop Protection (ADC);
- Build personnel capacity for an efficient use and without risk of pesticides and for an ecological disposal of unused products and empty packaging;
- Build capacity in terms of data collection and data banks establishment on pesticide management at research level;
- Ensure the training of analysts for pesticide analysis;
- Provide managers, resellers and pesticide inspectors with appropriate trainings;
- Training the medical and paramedical staff in diagnosing and treating pesticides poisoning;
- Create a directory of private operators of phytosanitary services;

Control and monitoring:

- Improve phytosanitary border control services facilities (ports, airports and lands) ;
- Establish a phytosanitary supervision and early warning system network;
- Set up a database on pesticide management;
- Carry out impact assessment on pesticide use

Liberia

Policy frame

The Liberia Agriculture Policy and Strategy April 2008 (Youdeowei 2009) identified the following as a component of the strategy for promoting agriculture production:

- Ensure that Plant Protection Bureau be established through the promulgation of an Act of Legislature and with physical, technical and financial support to manage, regulate, monitor, supervise and advise on the implementation and management of plant protection technologies, including IPDM practices;
- Ensure mechanisms are established for sensitization and awareness of the public, compliance and enforcement of the code of conduct on distribution and use of pesticides, especially the regulations on pesticides, application and equipment and operator training;
- Adopt IPM as a national strategy and provide institutional back-up to research to research and extension services
- Develop pest and disease management components and IPDM strategies for each of the major farming enterprises
- Use (FFS) Farmer Field Schools, or an equivalent approach, in applying IPDM to small scale farming activities.

Action Plan

At institutional and legal level:

- Organize a national workshop to disseminate the PMP;
- Assist in ensuring that a Plant Protection Service be established at the MOA through the promulgation of an Act of Legislature and with physical, technical and financial support to manage, regulate, monitor, supervise and advise on the implementation and management of plant protection technologies;

- Ensure that mechanisms are established for compliance and enforcement of the code of conduct on the distribution and use of pesticides, especially the regulations on pesticides, application equipment and operator training;

Training and capacity building:

- Increase the technical and organizational capacity of the MOA to promote IPM practices amongst small farm holders and to regulate the importation, distribution and use of pesticides in the efforts to promote sustainable food and agricultural productivity;
- Assist dealers in pesticides and application equipment to comply with international procedures and guidelines for the importation, distribution and sale of pesticides.

Monitoring:

- Assist the MOA to monitor, supervise and advise on the implementation and management of plant protection technologies.

Sierra Leone

At institutional and legal level:

- Organize a national workshop to disseminate the PMP;
- Strengthen SLARI and the Extension Services with resources and mobility, to enhance the generation and dissemination of research technologies for adoption by farmers.
- Support the enactment of new Pesticide Regulation called the Pesticide Management and Control.
- Support the development of an IPM Policy for Agriculture and IVM Policy for Health and build the capacity of all actors and stakeholders [extension workers, farmers, NGOs] involved in their implementation.
- Support the SLARI, to establish a Pest Management Research Program to backstop the extension service on the promotion of bio-pesticides, biological control, development of alternatives control methods using botanicals
- Support the development of a detail Pest Management Plan with a Pest and Disease database.
- Support for establishment of Plant Health Clinics

Technical measures

- Support the provision of Insecticide Treated Bed Nets for farmers closer to irrigation sites to reduce incidence of Malaria.

Training and capacity building:

- Strengthen the capacity of the Phytosanitary Service with Training and development of Inspection Manual and identification keys, to better prevent entry of quarantine pests into the country, to protect the agricultural industry.
- Training the farmers adequately on pest control techniques and pesticide use to compliment the efforts of the Extension Service to control pest outbreaks.
- Train and sensitize farmers on pesticide use and management to protect human health and the environment.
- Strengthen the Farmer Federation in Sierra Leone with mobility and resource to enhance their participation and contribution towards achieving food security for the growing population.

- Capacity building on IPM and Pesticide Management for all stakeholders in Districts and Chiefdoms, through the Farmer Field Schools established.
- Training the farmers adequately on pest control techniques and pesticide use to compliment the efforts of the Extension Service to control pest outbreaks.
- Train and sensitize farmers on IPM and Pesticide Management to protect human health and the environment, through the Farmer Field Schools

Monitoring:

- Support the Extension Service to conduct regular pest surveillance and control outbreaks of armyworms, grasshoppers and other pest and diseases.
- Support mobility for surveillance of pest and disease vectors of agriculture and human health importance, pesticide management in project intervention areas for key actors [MAFFS, EPA, NFASL, HEALTH, SLARI, CPU] involved in those intervention activities.

Togo

Legal and Institutional capacity building:

- Establish national centres for toxicant monitoring;
- Develop and implement a policy on chemical products;
- Build legal, institutional and technical capacities;
- Regulate the production, use, management and disposal of chemical products and effluents
- Develop a national strategy for rational environmental management of hazardous waste Develop and implement a mechanism for information sharing among stakeholders
- Set up structures for collaboration/coordination and provide them with adequate means

Technical measures:

- Project extension on dangerous pesticides monitoring on the national territory in Togo
- Support research programmes on relation issues between variety resistance and biological control
- Develop research protocols based on ecological theories leading to the association of variety resistance and biological control;
- Determine the contamination level of sites where chemical products have been applied;
- Proceed with the treatments of contaminated sites by POP;
- Proceed with the collection, storage and final disposal of expired chemical products
- Establish a national register on chemical products;
- Create a database with adequate formats;
- Put in place a harmonized labelling system for chemical products in Togo (including the translation of packaging labels),
- Accompany farmers in the acquisition of individual protection equipment ,
- Make the inventory and popularize alternatives to chemicals,
- Develop and implement security and health measures on work premises;
- Provide control technical services with adequate and sufficient means to achieve their mission.

Training/Sensitization –Capacity building:

- Training of Plant Protection village squads (BVPV)

- Sensitize on the dangers and good hygiene practices on the use of agricultural inputs.
- Create the public's awareness on the judicious use of pesticides, educate and inform them
- Build the capacity of laboratories in terms of pesticides dosage in foods

Control and monitoring:

- Reinforce customs border control and on the national territory;
- Ensure a better organization of standard board control and chemical products packaging.
- Reinforce pesticides registration procedures
- Reinforce risks assessment infrastructures.

7.3. Monitoring and Evaluation Plan

The Monitoring Plan is subject to WAAPP 1C planned activities. Monitoring is supported by data collection and analysis in order to check whether the implementation of activities is being carried out as expected and to move to immediate adaptation, if necessary. This involves a short-term evaluation activity to help take a real-time action. The frequency of the monitoring will depend on the type of information available, however monitoring will continue throughout the implementation of the action plan.

Comprehensive monitoring will be carried out in every country by WAAPP 1C Coordination Units. It will be organised through periodical field visits. A complete Monitoring Plan will be developed and made available to actors involved in the implementation and who, as much as each of them is concerned, are interested in the monitoring.

7.3.1. Monitoring indicators

At the level of every country, indicators to be followed during the implementation of both research and agricultural extension activities by CORAF/WECARD Environmental Focal Points (ESPF/CORAF/WECARD), Research Scientists, Plant Protection Services, Environmental Agencies and Health Services for countries are as follows:

- ***Monitoring during the planning and execution phase of agricultural research activities:*** during the planning and execution of agricultural research activities, regulatory provisions as well as environmental and social requirements contained in the outline shall be integrated and complied with.

- ***Monitoring during the extension phase of research projects:*** during the extension phase of research projects, monitoring will concern essential components described as follows: state of water resources, hydrometry and water quality; soil chemical fertility; pedology and soil degradation; soil physical property; soil behaviour and utilisation; animal and plant life development within the biodiversity; ecology and protection of the natural environment; pollution; nuisance and safety during operations; claims and conflicts monitoring. Monitoring will also be concerned with claims and conflicts.

Strategic indicators to be followed by ESFP/CORAF/WECARD:

- Nomination of ESFPs at country level (Research, Plant Protection Services);
- Holding of national PPMP sharing and dissemination workshops;
- Articulation and synergy level of the PPMP with national strategies in progress/in view;
- Environmental processes, stages and criteria during activities;
- Harmonised national regulations on pesticide management;
- Number of actors (per gender) trained/sensitised on good practices for pesticide management;
- “Research-Agriculture-Environment” databases harmonised;
- Efficiency of national environmental monitoring and reporting.

Indicators to be followed by national ESFPs (Research, Agricultural Services)

At the level of every target country, the following indicators have been proposed to be followed by EFPs.

Health and Environment

- Toxicity level of the products used
  - Available quantity of protection equipments
  - Level of knowledge about good management practices (pesticides, empty packages, etc.)
  - Level of impacts on domestic animals, aquatic organisms and fauna
  - Toxicity level of decomposed substances
  - Water resources contamination level
  - Status of emergency preparedness
  - Compliance with regulatory requirements

Storage/pesticide and empty packages management conditions

- % of available and adequate storage facilities
- Level of risks associated with transportation and storage
- Level of mastery of spraying and impregnation methods
- Number of equipments for disposing of functional packages, quantity of packages disposed of.

Staff training - Information/public awareness

- Number of training sessions organised;
- Number of officers trained as per category;
- Number of farmers adopting integrated control, good practices for pesticide management;
- % of people reached through awareness campaigns;
- Level of user knowledge about the products and the risks involved;
- Traders/distributors' knowledge level about the products sold.

Indicators to be followed by other public institutions

During the implementation phase of PPMP activities, monitoring will focus on main environmental components (water, soil, vegetation and fauna, living environment, health, etc.) and will be carried out by public structures responsible for the management of these components (Forest Services, Hydraulic Services, Health Services, etc.). Table 6 below provides the outline and specific indicators for this monitoring.

PPMP monitoring responsibilities

The community monitoring will be carried out by Research Institutions during the experimentation phase. During the extension phase, the community monitoring will be carried out by National Plant Protection and Health Services. The frequency of using alternative pest control methods will be evaluated as well. Special attention will be given to the monitoring and evaluation of the following points: checking non target groups in order to determine whether the campaign against pests and harmful insects does not pose any danger to other living organisms not targeted by this campaign; entomological surveys to control the vector population and the effectiveness of treatment programmes; operator health monitoring; and the choice of pesticides based on their environmental risks.

- Plant Protection Services will be responsible for the internal environmental monitoring of the PPMP in WAAPP 1C operation sites;
- Environmental Agencies will be responsible for the external environmental monitoring of the PPMP in WAAPP 1C operation sites;
- Health Ministries will be responsible for the external health monitoring in WAAPP 1C operation sites.

Table 4: Institutions responsible for country monitoring

N°	Countries	Institutions responsible for the monitoring
1	**Benin**	• Plant Protection and Pest Control Service (SVPCP) • National Agricultural Research Institute of Benin (INRAB) • ABE
2	**Guinea**	• National Plant Protection Service • National Rural Promotion and Farm Advisory Agency • Agricultural Research Institute of Guinea (IRAG) • National Plant Protection Laboratory • Environmental Directorate-general
3	**Liberia**	• EPA • CARI • MOA
4	**Sierra Leone**	• EPA • SLARI • Crop Protection Unit/MAFFS
5	**Togo**	• ANGE • ITRA • ICAT • DPV

7.3.2. Evaluation

Two evaluations will be carried out: a mid-term evaluation and an external evaluation in the course of the month that follows the end of the implementation in order to maintain the objectives of the action plan. The mid-term evaluation will be carried out by a consultant. It will be intended to determine the correct development of the management plan as well as mid-term results. Financial partners, beneficiaries of the project and other partners involved will fully participate in this evaluation. The external evaluation will involve measuring the effectiveness of the project as well as its performance and to identify lessons learnt. This evaluation will be integrated into that of WAAPP 1C.

Table 5 Summary of the Monitoring Plan

ESFPs/WAAPP 1C are responsible for coordinating the monitoring of the implementation of this monitoring plan.

Components	**Monitoring elements**	**Indicators and elements to be collected**	**Frequency**	**Institution responsible for internal monitoring**	**Institution responsible for external monitoring**
Water	Level of pollution/contamination of surface waters and underground resources (sinks)	• Physico-chemical and bacteriological parameters of water bodies (pesticide residues, etc.)	Once per year	• Plant Protection • Research Institutions • Research Institutions	• Hydraulic • Water laboratories • Environmental Services
Soil	Pollution level of pesticide storage sites	• Typology and emission quantity (solid and liquid)	Once per year	• Plant Protection • Agricultural Services • Research Institutions	• Environmental Services
Vegetation and fauna	Development of fauna and microfauna; condition of flora and animal and plant biodiversity	• Presence of toxic residues in plants and crops • Destruction level of non target organisms (animals, aquatic fauna, and vegetation)	Once per year	• Plant Protection • Agricultural Services • Research Institutions	• Forest Services
Human environment	Hygiene and health Pollution and nuisances Protection and safety during operations	• Types and quality of pesticides used • Number of mosquito nets provided during the anti-malaria campaign • Number of malaria cases on operation sites • Number of accidents/intoxication cases • Waste management (pesticide residues and empty packages) • Compliance with the carrying of protective equipments • Compliance with storage and pesticide use measures • Number of farmers sensitised on pesticide use • Level of the monitoring carried out by Plant Protection Officers	Once per year	• Plant Protection • Agricultural Services • Research Institutions	• FOs • Local communities Environmental Services Health Services

7.4. Training of actors involved in Pest and Pesticide Management

To ensure the effective integration of environmental concerns into the implementation of WAAPP 1C, it has been suggested to implement a capacitation programme (training and awareness) for all actors, which will focus on the following main issues: make the pest management strategy operational; promote the emergence of an expertise and pest management professionals; raise the responsibility level of employees in pesticide management; protect the health of and ensure the safety of populations and health workers.

The training will be targeted and adapted to beneficiary groups: Research Scientists, Plant Protection Officers, Agricultural Production Officers, Health workers, Farmer Organisations and other NGOs active in pest and vector control. Generally, the best trainers are found among the staffs of ministries responsible for health, environment and agriculture. The training will mainly focus on pesticide management workers, health and environmental workers to enable them to acquire the necessary knowledge about the content and prevention methods, to evaluate their working environment and improve it by reducing risk factors, to adopt precautionary measures that might reduce intoxication risks, to promote the use of protective equipments and to correctly apply the procedures to be followed in case of accident or intoxication. The training will also focus on village-level facilitators and other local people active in pest and vector control.

The training modules will concern the risks associated with pesticide handling, sound management methods (collection, disposal, storage, transportation, and treatment), adequate behaviours and good environmental practices, facilities and equipments maintenance, protective measures and measures to be adopted in case of intoxication, etc. A special emphasis will be laid on the requirements for a secure storage in order to avoid a mix up with other products of common domestic use as well as on the reuse of empty packages. It is recommended to train trainers by leading them to come out with a guidebook on good pesticide management practices rather than giving them a passive training. The contents of the training modules are indicated below:

Box 3: T**raining modules**

- Information on risks as well as health and safety advice
- Rules governing the storage and the conservation of pesticides by farmers
- Basic knowledge about risk handling and management procedures
- Carrying of protective and safety equipments
- Risks associated with pesticide transportation
- Handling, loading and offloading procedures
- Vehicle equipments
- Protective equipments
- Outline of treatment and operation procedures
- Health and safety in connection with the operations
- Emergency and relief procedures
- Technical procedures
- Maintenance of equipments
- Emission control
- Process and residue monitoring
- Biological monitoring of pesticide exposure

7.5. Information and awareness raising among users and the general public

The most impending dangers in farming come from uncontrolled use of pesticides usually meant for plant protection. But these products are ill-advisedly used to conserve cereals and for vegetable cultivation. Hence, there is the need for creating awareness on good use of pesticides and chemical fertilizers. Also, the awareness has to target in the first place the users of chemical fertilizers, notably farmers and traders who speculate about the risks involved in using some chemical preservatives dangerous to health. The awareness should seek to disseminate modern conservation methods, traditional granary systems that are very effective as well as biological and natural pest control methods.

At the level of importers and traders, it is essential to introduce a requirement that the products must be sold with detailed and simple handbooks providing information on the best use and the risks. In the same way, users must be cautioned about the quality of the products and the methods used for their conditioning.

At public level, the media should regularly organise extension programmes. The risk of intoxication by chemical products poses a serious problem for public health. There is the need to distinguish on the one hand: (i) health problems caused by food, i.e. by the consumption of foodstuffs (especially vegetables and cereals) infected by dangerous chemical products; (ii) health problems associated with the consumption of spoilt food (according to the expiry date) that have undergone chemical decomposition or contain chemical sweeteners; (iii) health problems associated with the use of expired phytosanitary products whose chemical constituents are corrupt or disintegrated due to failure to observe conservation rules or the non observance of the normal duration; (iv) health problems associated with overdosing.

On the whole, very little progress has been made in terms of information and public awareness on environmental and health risks in the countries. Specific actions by public services and the willingness to put in place regulations through legal texts remain marginal. It is essential to develop long-term strategies and effective approaches to inform and sensitise all stakeholders (street traders, wholesalers, agricultural users, rural populations, etc.), by working towards the following intervention areas:

- Design and disseminate video programmes and posters on the various risks, adapted to target groups;
- Create awareness among actors through radio and TV discussion programmes;
- Support trade unions operating in various relevant areas in order to create awareness among their members on professional risks associated with the use of chemical products in their respective areas.;
- Support consumer associations to sensitise the general public;
- Enhance the training of rural preceptors and extend their work via rural radio stations;
- Set up a National Standards Commission and Local Standards Commissions for both agricultural and industrial production;
- Set up a Chemical Safety Commission for the regulation of chemical products;

Information and awareness programmes, especially for the general public in general, and decisions makers in particular, are essential for reducing the risks of infection and intoxication by pesticides, and in the end, for true behavioural change. These programmes will be

multifaceted and will rely on supports from several sources. Public media can play a relatively important role in creating awareness among the general public and users. Federal agricultural structures, NGOs and Farmer Associations/Movements, territorial communities as well as community health structures will be involved in the public awareness.

7.6. Coordination and monitoring of the PPMP

Involvement of all actors in the coordination and the monitoring

The implementation of pest and pesticide management strategies is the concern of many actors and requires the participation of a wide range of national and international organisations. Agricultural development activities can result in the creation of adequate breeding sites for vectors, and eventually the increase in the impacts of vector-borne diseases. Furthermore, a safe and appropriate use of pesticides, including quality control and resistance management, requires cross-sectoral collaboration.

Several actors are involved in the implementation of planned actions, either individually or through partnerships. Pest and pesticide management requires full and close cooperation among Ministries of Agriculture/Livestock breeding, Health and other sectors such as the environmental sector, territorial communities as well as research institutions and laboratories, the private sector involved and environmental NGOs to develop harmonised approaches dealing with development in a sound environment. It is essential to establish communication and a close collaboration among institutions responsible for health, environment and agriculture to ensure necessary support for a smooth implementation of policies and strategies.

Multisectoral steering, coordination, monitoring and consultation structure

For a better vector control and pesticide management coordination, a multisectoral steering, coordination, monitoring and consultation structure needs to be put in place in every country to guide the process. Under WAAPP 1C, Ministries responsible for agriculture (Crop Protection Services) may carry out the secretariat work of this structure. Other Ministries (health, environment, etc.) and Research Institutions may come out with additional measures. The missions of the Steering Committee may include: organising a workshop for the preparation of a concerted response strategy; approving the composition of the groups to be involved in field activities; agreeing on the people or institutions that will carry out the interventions as part of the IMPP and the IVM; identifying the sites where the evaluation will be carried out; preparing an operational action plan; defining the charter of responsibilities for the implementation of the action plan; coordinating the monitoring of the implementation; This committee will be responsible for the coordination of the comprehensive monitoring of the execution of activities.

7.7. Institutional arrangements for the implementation and monitoring of the PPMP

At regional level, the coordination of the monitoring of the PPMP will be carried out by ESPFs/CORAF/WECARD.

At national level (every target country), the coordination of the PPMP will be carried out by WAAPP 1C Coordination Units. Therefore:

- ***WAAPP 1C ESFPs,*** especially those that are based within Plant Protection services**,** will coordinate the monitoring of the PPMP;

- ***Plant Protection Services*** will carry out the internal monitoring of the PPMP work package on "environment and health", and to that effect, regularly report to WAAPP 1C Coordination Units;

- ***Agricultural Protection Services*** will participate in the monitoring of the implementation of the PPMP and in building the capacity of their field officers;

- ***Health Services*** will carry out the external monitoring of the implementation of the PPMP work package on "health" , and to that effect, regularly report to WAAPP 1C Coordination Units;

  Note:
  Agricultural and phytosanitary risks, an area that falls under the Ministry responsible for agriculture, are associated with the use of veterinary inputs (especially pesticides) and products to stimulate and promote production in this sector; health risks, notably the lawful use of pharmaceutical products and various drugs used for medical purpose or for self-medication fall under the Ministry of Health.

- ***Environmental Services*** will carry out the external monitoring of the implementation of the PPMP work package on "environment";

- ***Research and analysis institutions and laboratories*** will help carry out the analysis of environmental components (analysis of pesticide residues in waters, soils, plants, crops, fishes, foodstuffs, etc.) in order to determine the various parameters of pollution, contamination and toxicity associated with pesticide use;

- ***Farmer Organisations:*** they will have in place and promote the enforcement of environmental procedures and good practices in terms of ecological and safe use and management of pesticides;

- ***Local communities:*** they will participate in public awareness and social mobilisation activities. They will also participate in the supervision and the external monitoring of the implementation of recommended measures as part of the PPMP;

- ***NGOs and the Civil Society:*** NGOs, CBOs and other environmental organisations of the civil society can also participate in informing, educating and sensitising farmers and the general public on environmental and social aspects associated with the

implementation the PPMP as well as the monitoring of the implementation and environmental surveillance.

Table 6: Summary of the institutional machinery and the responsibility charter

N°	Countries	Institutions /actors	Responsibilities
Regional level			
1	CORAF /WECARD/ES	ESFP	• Regional level coordination of the implementation of the PPMP
National level			
2	Benin	WAAPP Coordination Unit	• Coordinate the implementation of the PPMP
		Plant Protection and Pest Control Service and INRAB	• Internal monitoring of the implementation of the PPMP work package on “environment and health” • Report to the Coordination Unit
		ABE	• External monitoring of the implementation of the PPMP work package on “environment”
3	Guinea	WAAPP Steering Committee	• Coordinate the implementation of the PPMP
		National Plant Protection Service and IRAG	• Internal monitoring of the implementation of the PPMP work package on “environment and health” • Report to the Steering Committee
		National Environment Directorate	• External monitoring of the implementation of the PPMP work package on “environment”
4	Liberia	WAAPP Steering Committee	• Coordinate the implementation of the PPMP
		Quarantine Division (MOA) et CARI	• Internal monitoring of the implementation of the PPMP work package on “environment and health” • Report to the Steering Committee
		Environment Protection Agency of Liberia (EPA)	• External monitoring of the implementation of the PPMP work package on “environment”
5	Sierra Leone	WAAPP Steering Committee	• Coordinate the implementation of the PPMP
		Crop Protection Unit (CPU) et SLARI	• Internal monitoring of the implementation of the PPMP work package on “environment and health” • Report to the Steering Committee
		Environment Protection Agency of Liberia (EPA)	• External monitoring of the implementation of the PPMP work package on “environment”
6	Togo	WAAPP Steering Committee	• Coordinate the implementation of the PPMP

		Plant Protection Directorate ITRA ICAT Hygiene Service	• Internal monitoring of the implementation of the PPMP work package on “environment and health” • Report to the Steering Committee
		Environment Directorate - general (DGE)	• External monitoring of the implementation of the PPMP work package on “environment”

7.8. Cost of activities proposed in the PPMP

The cost items below concern activities that are likely to be sponsored under WAAPP 1C. These are (i) sub-regional measures that will be led by CORAF/WECARD/ES and which concern all target countries and (ii) national measures (specific for every country) which will be led by WAAPP 1C ESFPs and National Steering Committees.

Table 7 Cost of activities

Area	Proposed measures	Cost (in CFA Franc)						
		Benin	Guinea	Liberia	Sierra Leone	Togo	CORAF/ WECARD	Total
Sub-regional measures: 105,000,000 FCFA								
Institutional	Sub-regional workshop for sharing the PPMP	-	-	-	-	-		**40,000,000**
Technical	Handbook on Good User Practices	-	-	-	-	-		**20,000,000**
	Sub-regional database on PPM	-	-	-	-	-		**30,000,000**
Monitoring-Evaluation	Sub-regional coordination and monitoring	-	-	-	-	-		**15,000,000**
National measures: 475,000,000 FCFA								
Institutional	Set up a Coordination and Monitoring Committee	-	-	-	-	-	-	
	National PPMP sharing workshop	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	-	**25,000,000**
Regulatory	Support the harmonisation of national texts	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	-	**25,000,000**
Technical	Harmonise national databases	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	-	**50,000,000**
	Support the experimentation of biological control	20,000,000	20,000,000	20,000,000	20,000,000	20,000,000	-	**100,000,000**
Training/awareness	Build the capacity of actor structures	20,000,000	20,000,000	20,000,000	20,000,000	20,000,000	-	**100,000,000**
	Awareness among agricultural users and traders	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	-	**50,000,000**
Monitoring-Evaluation	Community Monitoring	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	-	**50,000,000**
	Supervision	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	-	**25,000,000**
	Mid-term evaluation Final evaluation	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	-	**50,000,000**
TOTAL								**FCFA 580,000,000**

APPENDICES

Appendix 1: List of registered or banned pesticides in Guinea

Active or banned substances in Guinea

N°	Designation	Family
01	2 ,4,5 – T	Phenoxy by-product
02	Aldicarb	Carabamic acid
03	Aldrin	Organochlorine
04	Aminotriazole	Triazole
05	Binapacryl	Benzene by-product
06	Cadusafos	Organophosphorus
07	Camphechlor	Organochlorine
08	Captachlore	Organochlorine
09	Captafol	Phtalimide
10	Chlordane	Organochlorine
11	Chlordecone	Organochlorine
12	Chlordimeform	Formamidine
13	Chlorfenvinphos	Organophosphorus
14	Chlormephos	Organophosphorus
15	Chlorobenzilate	Organochlorine
16	Chloropicrine	Organophosphorus
17	Crimidine	Pirimidine
18	Cyhéxatin	Organotin
19	DDT	Organochlorine
20	Demeton	Organophosphorus
21	Dialiphos	Organophosphorus
22	Dicofol	Organochlorine
23	Dieldrine	Organochlorine
24	Dienochlore	Organochlorine
25	Dimefox	Organophosphorus
26	Dinoseb	Nitrate compound
27	Disulfoton	Organophosphorus
28	DNOC	Phenols
29	Endrin	Organochlorus
30	Ethoprophos	Organophosphorus
31	Fenamiphos	Organophosphorus
32	Flocoumafen	Coumarin
33	Fonofos	Organophosphorus
34	HCH	Organochlorine
35	Heptachlore	Organochlorine
36	Hexachlorobenzene	Aromatic compound
37	Lindane	Organochlorine
38	Mercuric (compound)	Inorganic
39	Methamidophos	Organophosphorus
40	Methidathion	Organophosphorus
41	Methomyl	Carbamate

42	Methoxychlor	Organochlorine
43	Mirex	Organochlorine
44	Monocrotophos	Organophosphorus
45	Nitrofene	Diphenyl
46	Paraquat	Ammonium quaternary
47	Parathion-éthyl	Organophosphorus
48	Parathion-methyl	Organophosphorus
49	Pentachlorophenol	Organochlorine
50	Phentoate	Organophosphorus
51	Phorate	Organophosphorus
52	Phosphamidon	Organophosphorus
53	Piclorame	Piclolinic acid by-product
54	Prothoate	Organophosphorus
55	Quintozène	Nitrate by-product
56	Strobane	Organochlorine
57	TCA	Organic halogen acid
58	Télodrine	Organochlorine
59	Terbufos	Organophosphorus
60	Trichloronat	Organophosphorus

Active substances with regulated usage

N°	Designation	Family
01	Azinphos-ethyl	Organophosphorus
02	Azinphos-methyl	Organophosphorus
03	Brodifacoum	Hydroxy-4-coumarin
04	Bromadiolone	Hydroxy-4-coumarin
05	Bromophos-ethyl	Organophosphorus
06	Carbofuran	Carbamates
07	Chlorophacinone	Indanedione by-product
08	Coumachlore	Coumarine
09	Cyhalothrine	Pyrethrinooid
10	Fenvalerate	Synthesis of Pyrethrinoid
11	Ferbame	Dithiocarbamate, organo-ferrous
12	DDVF (dichlorvos)	Phosphoric esters
13	Dicrotophos	Organophosphorus
14	Difenacoum	Hydroxy-4-coumarin
15	Diphacinone	Chlorophacinone
16	EPN	Organophosphorus
17	Monolinuron	Urea substitutes
18	Pyrazophos	Pyrazolopyrimidine

Appendix 2: Good Management Practices Guide and Pesticides Management Measures

a. Required measures for the reduction of pesticides-related risks

Safe use of pesticides

Pesticides are toxic for pests for also for humans. However, if sufficient precautions are taken, they should not constitute a threat either for the population or for non-targeted animal species. Most of them can have harmful effects if swallowed or in case of prolonged contact with the skin. When a pesticide is sprayed in the form of fine particles, there is a risk of absorbing them with the air we breathe. There is also a risk of water, food and soil contamination. Specific precautions should therefore be taken during the transportation, storage and handling of pesticides. The spraying equipment should be regularly cleaned and well maintained to avoid leakages. The individuals using pesticides should learn how to use them safely.

Insecticides registration

Reinforce the registration process of insecticides by ensuring:

- Streamlining, between the national pesticides registration system and other products used in Public Health;
- Adoption of WHO specifications applicable to pesticides for national registration process purposes;
- Reinforcement of the pilot regulatory body;
- Collection and publication of data relating to imported and manufactured products;
- Periodical review of registration.

It is also recommended, when planning to buy pesticides to control vectors, to consult the guiding principles issued by WHO. For the acquisition of insecticides intended for public health use, the following guidelines are recommended:

- Develop national guidelines applicable to the purchase of products intended for vector control and ensure that all the agencies buying them strictly comply with those guidelines;
- Use synthetic Pyrethroids: Deltamethrin SC, Permethrin EC, Vectron, Icon, Cyfluthrin, as recommended by the national policy;
- Refer to the guiding principles issued by WHO or FAO on calls for tenders, to FAO recommendations regarding labeling and to WHO recommendations regarding products (for indoor spraying);
- Include in calls for tenders, the details regarding technical support, maintenance, training and products recycling that will be part of the after-sale service committing manufacturers; apply the back-to-sender principle;
- Control the quality and quantity of each lot of insecticides and impregnated supports before receiving the orders;
- Ensure that the products are clearly labeled in French and if possible in local language and in the strict respect of national requirements;

- Specify which type of package will guarantee efficiency, preservation duration as well the human and environmental security of handling packaged products while strictly complying with national requirements;
- Ensure that donated pesticides intended for public health, comply with the requirements of the registration process in Mali (CSP) and can be used before their expiry date;
- Establish a consultation, before receiving a donation, between the ministries, agencies concerned and the donors for a sound use of the product;
- Request users to wear protective clothes and equipment recommended in order to reduce their exposition to insecticides to the strict minimum;
- Obtain from the manufacturer a physic-chemical analysis report and the product acceptability certification;
- Request the manufacturer to submit an analysis report of the product and of its formulation along with guidelines to follow in case of intoxication;
- Request the buying agency to perform a physic-chemical analysis of the product before shipping and arrival.

Precautions

Labelling

Pesticides should be packaged and labelled according to WHO standards. The label should be written in English and French and in the local language; it should indicate the content, the safety instruction (warning) and any action to be taken in case of accidental ingestion or contamination. The product should always remain in its original container. Take all appropriate precautionary measures and wear protective clothes in accordance with recommendations.

Storage and transportation

Pesticides should be stored in a place that can be locked up and is not accessible to unauthorized individuals or children. The pesticides, should, in no event, be stored in a place where they could be mistaken for food or beverage. They should be kept dry and out of the sun. They should not be transported in a vehicle that also carries food products.

In order to ensure safety during storage and transportation, the public or private agency in charge of managing purchased insecticides and insecticide-impregnated supports, should comply with the current regulations as well as the conservation conditions recommended by the manufacturer regarding:

- Preservation of the original label;
- Prevention of accidental pouring or overflowing;
- Use of appropriate containers;
- Appropriate marking of stored products;
- Specifications regarding the local population;
- Products separation;
- Protection against humidity and contamination by other products;
- Restricted access to storage facilities;
- Locked storage facilities to guarantee product integrity and safety.

Pesticides warehouses should be located far from human residences or animal shelters, water supplies, wells and channels. They should be located on an elevated surface and secured with fences with restricted access for authorized individuals only.

Pesticides should not be stored in places where they could be exposed to sunlight, to water or to humidity, which could harm their stability. Warehouses should be secured and well ventilated.

Pesticides should not be transported in the same vehicle with agricultural products, food products, clothes, toys or cosmetics as these products could become dangerous in case of contamination.

Pesticides containers should be loaded in vehicles in order to avoid damages during transportation, that their labels will not tear off so that and they would slip off and fall on a road with an uneven surface. Vehicles transporting pesticides should bear a warning sign placed conspicuously and indicating the nature of the cargo.

Distribution

Distribution should be based on the following guidelines:

- Packaging (original or new packaging) should ensure safety during the distribution and avoid the unauthorized sale or distribution of products intended for vector control;
- The distributor should be informed and made aware of the dangerous nature of the cargo;
- The distributor should complete delivery within the agreed deadlines;
- The distribution system of insecticides and impregnated supports should enable to reduce the risks associated with the numerous handlings and transportations;
- In the event the purchasing department is not able to ensure the transportation of the products and materials, it should stipulated in the call for tenders that the supplier is expected to transport the insecticides and impregnated supported up to the warehouse;
- All pesticides and spraying equipment distributors should have an exploitation permit in accordance with the current regulation in Mali.

Disposal of pesticide stocks

After the operations, the remaining stocks of pesticides can be disposed of without risk by dumping them in a hole dug specifically or in a pit latrine. A pesticide should not be disposed of by throwing it in a place where there is a risk of contaminating drinking water or for bathing or where it can reach a pond or a river. Some insecticides, such as pyrethroids, are very toxic for fish. Dig a hole to at least 100 meters from any stream, well or habitat. If in hilly areas, the whole must be dug below. Pour all waters used for hand washing after the treatment. Bury all containers, boxes, bottles, etc. that have contained pesticides. Reseal the hole as quickly as possible. Packaging or cardboard, paper or plastic containers— the latter cleaned — can be burnt, if allowed, far away from homes and drinking water sources, regarding the re-use of containers after cleaning.

Pyrethroid suspensions can be discharged on a dry soil where they are quickly absorb and then will go through a decomposition process making them harmless for the environment.
If there is an amount of insecticide solution left, it can be used to destroy ants and cockroaches. Simply pour a little bit of solution on infested areas (under the kitchen sink, in corners) or to rub a sponge soaked with water on it. To temporarily prevent insect

proliferation, a certain amount of solution can be poured inside and around latrines or on other breeding places. Pyrethroid suspensions for mosquito nets treatment and other fabrics can be used days after their preparation. It can also be used to treat mats and rope mattresses to prevent mosquito to bite from the bottom. Mattresses can also be treated against bugs.

Cleaning of empty pesticide packaging and containers

Re-using empty pesticide containers is risky and it is not recommended to do so. However, it I estimated that some pesticide containers are very useful to be simply thrown away after use. Can we therefore clean and re-use such containers? This depends both on the material and the content. In principle, the label should indicate the possibilities for re-using containers and how to clean them.

Containers having contained pesticides classified as hazardous or extremely dangerous should not be re-used. Under certain conditions, containers of pesticides classified as dangerous or that do not present any risk under normal use, can be re-used unless they are not used as food or drink containers or as food containers for animal food. Containers made of materials such as polyethylene that preferentially absorb pesticides, must not be re-used if they have contained pesticides whose active ingredient has been classified as moderately or extremely dangerous regardless of the formulation. Once a recipient is empty, it should be rinsed, then filled completely with water and allowed to stand for 24 hours. Then it should be emptied and this process should be done over again.

General Hygiene

Do not eat, drink or smoke when handling insecticides. Food should be placed in tightly closed containers. Measurement, dilution and transfer of insecticides should be done with the adequate material. Do not shake or take liquid with unprotected hands. If the nozzle is blocked, press the pump valve or unblock the opening with a flexible rod. After each fill, wash hands and face with water and soap. Eat and drink only after washing hands and face. Take a shower or a bath at the end of the day.

Individual protection

- Adapted coveralls covering hands and legs
- Dust, gas and respirator masks, based on the type of treatment and product used
- Gloves
- Goggles
- Hoods (facial shield)

Protection of the population

- Minimize the exposure of local populations and livestock
- Cover wells and other reservoirs
- Sensitize populations on risks

Protective clothing

<u>Treatments inside homes</u>

Operators should wear coveralls or a long sleeves shirt over a pair of pants, a flapped hat, a turban or any other type of headgear as well as boots or big shoes. Sandals are not suitable. Nose and mouth should be protected using a simple method, for example a disposable paper

mask, a disposable surgical or washable mask or a clean cotton cloth. Once the fabric is wet, it should be changed. Clothing must be in cotton for easy washing and drying. It must cover the body and contain no opening. In hot and humid climates, it can be uncomfortable to wear additional protective clothing; therefore one will be forced to spray pesticides during hours when it is very hot.

Preparation of suspensions

People responsible for bagging insecticides and preparing suspensions, particularly for the treatment of mosquito bed net units must take special precautions. In addition to the above-mentioned protective clothing, they must wear gloves, an apron and eye protection, for example a facial shield or glasses. Facial shields protect the entire face and keep less warm. Nose and mouth should be covered as indicated for treatment in homes. They should ensure that they do not touch any part of their body with gloves during pesticide handling.

Treatment of nets

To treat mosquito nets, clothes, grills or with tsetse traps with insecticides, it is necessary to wear long rubber gloves. In some cases, additional protection is required, for example against vapours, dusts or insecticide dusting that could be dangerous. These additional protective accessories should be mentioned on the product label and may consist of aprons, boots, facial masks, coveralls and hats.

Maintenance

Protective clothing should always be impeccably maintained and should be checked periodically to verify tearing, wearing that could lead to skin contamination. Protective clothing and equipment should be washed daily with water and soap. Particular attention should be paid to gloves and they must be replaced once they are torn or show signs of wear. After usage, they should be rinsed in water before removing them. At the end of each working day, they will need to be washed inside and outside.

Safety measures

During spraying

Spurt form the sprayer must not be directed towards a part of the body. A leaking sprayer must be repaired and skin must be washed if it is accidentally contaminated. The household and animals must stay outside during the whole spraying activity. Avoid treating a room where there is a person — a sick person for example — who cannot be taken outside. Before starting spraying activities, kitchen utensils should be taken out and all utensils as well as dishes containing drinks and food. They can be gathered in the centre of the room and covered with plastic film. Hammocks and paintings should not be treated. The bottom part of furniture and the side against the wall should be treated while ensuring that surfaces are effectively treated. Sweep or wash the floor after spraying. Occupants should avoid contact with walls. Clothing and equipment should be washed everyday. Avoid spraying organophosphate or carbamate for more than 5 to 6 hours daily and wash hands after each filling. If Fenitrothion is used or old stocks of Malathion are used, operators should control the level of cholinesterase in their blood every week.

Monitoring exposure to organophosphate

There are country kits available on the market to control cholinesterase activity in the blood. If this activity is low, it can be concluded that there excessive exposure to organophosphate insecticide. These dosages should be done every week with people handling such products. Any person whose cholinesterase activity is very low should be stopped from working until it returns to normal.

Fabric spraying

When handling insecticide concentrates or preparing suspensions, gloves should be worn. Attention should be paid particularly to spraying in the eyes. A big bowl not too high should be used and the room should be well ventilated to avoid inhaling smokes.

b. Measures to minimize transportation, storage, handling and usage risks

Step	**Determining factor**	**Risks**			**Mitigating measures**
		Public health	**Environment**	**Personnel**	
Transport	Lack of training		Accidental discharge, water-table pollution through leaching	Product inhalation : vapour, dust, risk of skin contact	- training—in-depth sensitization of pesticide management personnel on all aspects of the pesticide chain as well as on emergency responses - provide the personnel with protective equipment and encourage them to wear it - Provide the personnel with adequate storage facilities, refurbish existing sites - proceed to awareness-raising among the public on pesticide use and their containers - training on empty containers for a safe disposal - ban high volume containers to transfer - reduce the quantity of pesticides used
Stockage	Lack of means moyen Deficit in pesticide management training	Accidental contamination Inconvenience of populations living in the vicinity	Soil contamination	Skin contact through Contact avec la peau through accidental spillage caused by the narrowness of the premises	
Handling manipulation	Deficit in training and sensitization	Contamination of water sources through washing of containers	Soil contamination through accidental spillage or intentional discharge, water-table pollution	Vapour Inhalation, skin contact through splashing during preparation or product transfer	
Disposal of packaging	Deficit in training and sensitization	Product ingestion by re-using containers		Skin contact and respiratory tract	

Washing of containers	Deficit in training and sensitization	Skin contact, contamination of wells	Acute poisoning of fish and other crustacea, pollution of wells, ponds, water-tables	Skin contact	through use of efficient alternatives

c. Poisoning symptoms and appropriate care to victims

Poisoning symptoms	Appropriate care
Eye contamination (pain or irritation)	• Rinse well with tap water • If the condition worsens, consult a physician
Skin irritation (tingling and burning sensation)	• Wash affected part with water, *never* with oil • Apply a soothing cream on it • If symptoms persist, consult a physician
Tiredness, headaches or dizziness	• Rest • Do not start over until after complete rest • If symptoms persist, consult a physician
Lungs contamination	• Stay in the shadow • Place under medical observation

d. Treatment methods of empty containers

Treatment of empty containers is focused on two fundamental activities: decontamination and the actual disposal with its primary packaging.

Decontamination

It comprises three steps and concerns all pesticides containers:

- ensure maximum product emptying and drainage for 30 seconds (the content is emptied into a mixing container, in glass for the final dosage (for spraying) ;
- rinse the container at least three times with a volume of water not less than 10% of the container total volume;
- pour rinse water in a sprayer, in a pit (spraying).

A decontaminated container does not however, qualify for storage of food or animal feed or for water or domestic consumption.

Disposal

Unless intended for recycling, the first disposal activity consists in making them unusable for other purposes: « packaging». Holes should be made with a sharp tool and the container should be flattened when it is metal cans and drums; glass bottles should be broken in a bag to avoid splinters; plastics are shredded and ground. Capsules and screws are removed beforehand.

Combustible containers are disposed of through monitored burning (paper and plastic packaging [PVC containers must not be burnt], carton) or deposited in a landfill accepting toxic waste of this nature (tear into pieces plastic jugs, glass containers and metal cans); ashes resulting from burning in the air are buried. However, the sticker on the container can bear a notice not recommending burning. Indeed, burning for example of some phenoxyacetic acid-

based herbicidal containers can lead to the release of fumes toxic for human and surrounding flora.

Precautions: combustion must neither take place under conditions where wind is not likely to send toxic smoke towards houses, livestock, granary in the vicinity, nor towards those carrying the operation.

Non-combustible high volume recipients 50 to 200l can follow the chain as follows:

- return to supplier,
- sale/recovery to/by a company specialized in the sale of drums and used barrels with adherent material toxicity neutralization technologies that can proceed to recovery,
- evacuation towards a monitored landfill whose owner is informed of drums content and is warned about the potential release of toxic fumes if combustion is applied,
- evacuation towards a private site, fenced, guarded, while respecting environmental standards and used specifically for pesticides.

Non-combustible low volume recipients up to20 l are either:

- conveyed towards public landfill,
- buried on private site after removal of capsules or covers, perforation of containers, breaking of glass containers. The pit with a depth of 1 to 1.5 m used for burial purposes will be filled up to 50 cm of the soil surface and then covered with soil. The site will be away from homes and water bodies (wells, ponds, rivers), should not be cultivated and will not be in a flooding area ; ground-water level should be at least at 3 m from the soil surface, the soil must be waterproof (clay-like or light sandy). The site will be fenced and identified.

Appendix 3: Basic principles of integrated control

PRINCIPLES	IMPLEMENTATION	RESULTS
PRINCIPLE 1 Obtain and plant quality planting material	Choose seeds, cuttings, tubers or residues from very productive, healthy varieties and resistant to pests/diseases. To obtain certified seeds, contact registered seeds growers of national research centres. Farmers could plant material taken from healthy plants from the previous campaign. Do not stock planting material for more than one season. Carry out summary germination tests.	The use of quality planting material will provide a healthy and productive and consequently a quality harvest. Certified varieties are often resistant to several pests and diseases. Remember the popular saying that good seeds make good harvests.
PRINCIPLE 2 Choose fertile soils and areas adapted to planting	Select soils with good natural drainage, suitable for cultivation. Some farming (low-land rice or irrigated rice for example) prefer submerged soils. Always perform cultivation in weed-free farms.	Crops need a maximum soil management and water to develop and compete effectively with weeds.
PRINCIPLE 3 Adopt good practices in nursery	Establish nurseries on disease-free soils to promote growth of seedlings. Cover the sol with mulch of neem leaves or dry grass.	After replanting in farm, rigorous seedlings will produce sturdy plants.
PRINCIPLE 4 Adopt devices and	Plant in line, with an appropriate space to avoid an excessive density. Intercropping is generally practiced in rows, alternated rows or strips.	A very high density prevents crop development and by creating a humid environment, encourages

adequate planting devices		the emergence of diseases. Planting in line help save seeds and carry out easily agricultural activities such as weed control. Intercropping reduces pressure from insects and guarantees yields.
PRINCIPLE 5 Planting crops at the right time to synchronize them growth period with a low incidence of pests and diseases	Schedule planting to avoid periods of pest and disease prevalence in farms. Coordinate plantation dates at the regional level to prevent pest from moving between crops and to maintain a seasonal rest period.	The crop defies strong incidence of pests and diseases during their development and growth. Pest development cycle is interrupted. Pest populations do not have the necessary time to reproduce massively.
PRINCIPLE 6 Practice crop rotation	Plant successively crop that do not have common pest (cereals and root and tuber crops rotation with vegetables and legumes for example). Plant blanket crops during fallow (for example velvet bean).	Crop rotation prevents the proliferation of diseases and soil-borne pest (nematodes or pathogens for example). Blanket crops enrich soils and suffocate weeds.
PRINCIPLE 7 Adopt good soil conservation practices	Cover the ground with mulch, improve soil with compost or organic fertilizer and if needed, correct the nutrient balance with mineral fertilizers to enrich less fertile soils. Split fertilizer inputs, particularly nitrogen to better meet crop needs.	Poor soils are enriched at little cost to stimulate the growth and development of healthy crops and to obtain high yields. The fertilizer is used in a cost-effective manner.
PRINCIPLE 8 Adopt adequate water management practices	Plant in soils with good natural drainage (except for rice). If necessary, build drainage channels to eliminate excess water; prepare water harvesting channel (in banana plantations, for example) for sufficient water reserve. In irrigated condition, irrigate plants regularly depending on their need.	Crop development and growth are not compromised by lack of water; in addition crops do not suffer from water-logging.
PRINCIPLE 9 Regularly remove bad weeds	Place crops in weed-free farms. To prevent the production of seeds with weeds, hoe within three weeks after planting and hand-hoe superficially until the crop is covered. Pull out first seedlings of Striga before flowering and bolting.	This measure helps to save labour cost and avoid harming crop roots. Competition between crops and weeds is eliminated; the latter fail to produce seeds. Parasitic weeds cannot settle in farms.
PRINCIPLE 10 Regularly inspect farms	Inspect farms every week to monitor crop growth and development, follow the development of auxiliaries and quickly detect the emergence of pests, diseases and weeds; carry out an agro-ecosystem analysis and decide on crop activities to be carried out.	Regular inspection of farms enables farmers detect problems and implement necessary integrated control measures to avoid extension of damage and consequently considerable yield losses.
PRINCIPLE 11 Keep farms perfectly	Always keep farms clean. Remove all residues (plants from previous year and plant residues for example); most residues are used as forage	These results prevent pests and disease proliferation and their moving from one plant to the

clean	for livestock. Pull out and destroy crops with disease symptoms at early vegetative cycle. After harvest, remove crop residues (mow them and use them as forage for livestock or bury them)	other. Pest and diseases cannot spread to the whole farm.
PRINCIPLE 12 Combat pests and diseases effectively	Adopt a strategy on the prevention and growth of auxiliaries. Avoid control methods that are harmful to human or crops as well as those degrading the environment; give preference to mechanical or natural methods (neem tree seeds/leaves extract, soapy solution for example). If the resort to chemical pesticide becomes inevitable, (for example in case of forest pest infestation, apply appropriate product in recommended areas, in accordance with required techniques in compliance with precautionary measures.	Pest problems and diseases are under control contributing to a high and sustainable production with low-cost inputs. Natural products are cheaper and less harmful to human and the environment.
PRINCIPLE 13 Encourage growth of natural enemies (auxiliaries)	Adopt practices that create enabling environmental conditions for the reproduction of enemies (minimal use of synthetic pesticide, use of plant producers such as neem tree extract and mulching to stimulate the reproduction of natural enemies such as predator ants, spiders, beetles, flower flies and ladybirds).	Pest populations are efficiently and naturally controlled by a significant population of natural enemies. Natural pest control is neither harmful to human nor to the environment.
PRINCIPLE 14 Minimize chemical pesticide application	Avoid the systematic and regular application of pesticides. If really needed, use only selective pesticides. Give preference to plant products. Do not use phytopharmaceutical products as soon pests or early symptoms appear. Always analyze the agro-system (AESA) before any treatment. In the event of pest overgrowth and considerable damage, use natural products (neem tree seeds/leaves extract or soapy solution).	The parsimonious use of selective chemical pesticides allows auxiliary populations (predator ants, spiders, mantis and ladybirds, for example) to grow at the expense of pests. It is a natural method for controlling pest.
PRINCIPLE 15 Adopt good practices of harvest	Harvest crops upon maturity; be prudent to avoid harming, tearing, breaking or cause damage to harvested produce. Avoid harvesting or storing fruits and vegetables in the sun.	Farmers obtain better prices for clean and pest-free produce. Pest-free produce is easily conserved as it does not constitute an entry point for pests and pathogens. Freshly harvested produce and preserved at low temperature are conserved for a long time.
PRINCIPLE 16 Adopt appropriate and quality storage facilities.	Warehouses are always clean, dry and well ventilated. Store only whole produce. Keep harvests in tight containers to protect them from pests of granaries. In general, damage caused pests become significantly worse after three months of storage; therefore, distribute harvests in several batches according to their shelf life. Process only batches intended for	The quality of products stocks is maintained during warehousing. Store products are not too much exposed to pest and pathogen contamination. Stored grains remain dry. Recommended pesticides for stock treatment are used economically.

	long-term preservation (with appropriate products like neem tree oil or recommended pesticides for store products).	

Appendix 4: Persons met

List of persons met - Benin

FIRST NAMES & SURNAME	TITLE	ADDRESS
Virginie Assogba-Miguel	Conseiller Technique à la Recherche, à l'Agriculture et à l'Alimentation	MAEP
David Y Arodokoun	Assistant CTRAA	MAEP
Adanve Grégroire	Chef Division Alertes et Interventions Phytosanitaires	SPVCP
Maurice C. Noudofinin	Chef Service Protection des Végétaux et au Contrôle Phytosanitaire	SPVCP
Ramanou Atanda Fassassi	Directeur du Conseil Agricole et de la Formation Opérationnelle PI	MAEP/DICAF
Rachidatou Sikirou	Directeur Laboratoire de Défense des Cultures	INRAB
Akambi Massiou	Chef Service Suivi Evaluation	MAEP/DICAF
Henriette M. Gotoechan Hodonou	Chef Unité Planification Suivi Evaluation	INRAB
Ahandagbe A Etienne	Directeur Administration et Ressources Humaines	INRAB
Alex Gbêliho Zoffoun	Agent Direction scientifique Service d'Animation Scientifique	INRAB
Zanou Aivohozin	Directrice des Politiques, Stratégies et Normes environnementales	MEPN
Camille A Dagba	Directeur de l'Information et du Suivi Environnementale	ABE
Lokossou Léopod	Président PNOPPA	Bohicon
Tiburce Kouton	Secrétaire Permanent FUPRO	Bohicon
Toto Bernadin	Secrétaire Permanent PNOPPA-Bénin	Cotonou
Pedro Ernest	Chargé de programme Plate Forme des Acteurs de la Société Civil e du Bénin	Cotonou
Alidou Aïcha	Responsable Cellule Femme dans le Développement Agricole et Rurale	MAEP
M Omontecho	Agent au Service Formation	MAEP/DICAF

List of persons met- Guinea

SURNAME & FIRST NAMES	TITLE	ORGANISATION
Dr. Famoi BEAVOGUI	Directeur général	IRAG
Dr Mamadi Kourouma	Chef de section Planification suivi et évaluation	
Dr Karika Magassouba	Chef de la division appui scientifique	
Mr SYLLA Sékou	Directeur Général Adjoint	Bureau de stratégie et de développement du ministère de l'agriculture
Namory Keïta	Directeur National Adjoint	Direction Nationale des Forêts

	(Ingénieur Spécialiste de Faune)	et de la Faune
El Hadj Nouhou Cissé	3ième vice –président (Ingénieur)	Chambre Nationale d'agriculture
Joseph Boniface Mansaré	Directeur National Adjoint	Direction Nationale des Productions et Industries Animales
Mamadou Mouctar Sow	Directeur National	
Bernard Mansaré		Agence Nationale Promotion Rurale et Conseil Agricole
Ibrahima Bah	Chargé de Programmes	Confédération nationale des organisations paysannes de Guinée
Sékou Moussa KEÏTA	Directeur des Etudes	Centre d'Etude et de Recherche en Environnement
KABA ABDOULAYE AZIZ	Consultant Indépendant Mécanisation Agricole	Direction Nationale de l'Agriculture
Dr Thierno Hamidou Baldé	Chef Section défense de Cultures et des Stocks	Direction Nationale de la Protection des Végétaux et des Denrées Stockés
BALDE Abdourahamane K.B.	Directeur	
Mr Traoré Diarra Pablo	Ingénieur Phytopathologiste	
Mr. Adoul Karim Camara		
Mr. Ali Kouyaté	Chef de Division Semences et Intrants Agricole/Engrais	Direction Nationale de l'Agriculture
Mr. Namory Yombouno	Chef Section Contrôle et Reglementation / Semences Plants et Fertilisants	
Mr. Sakho Souleymane	Division Intensif et Mécanisation Agricole	
El Hadj Barry Sadu	Directeur National du Service de Ressource Foncière Rurale	
Diawara Karamba	Chargé d'Etudes de la DIMA	
Bernard Mansaré	Directeur Général Adjoint	Agence National Promotion Rurale et Conseil Agricole
Amidou Souaré	Volet Appui Conseil et la coordination des autres sous Composantes	
Mr. Bah ALIMOULAYE	Directeur National Adjoint de l'Environnement	Direction nationale de l'environnement
Mr. Touré Aboubacar	Chargé d'Etudes	Bureau de stratégie et de Developpement de l'environnement
Mr. Mouhamed Lamine Touré	Chef de Section du Suivi du PGES	Bureau de stratégie et de Developpement de l'environnement
Ibrahima Bah	Chargé des Programmes	Confédération Nationale des Organisations Paysannes de Guinée
Mme Aïssata Yatara	Conseillère Régionale, vice Psdt de la CNOP	
Phylipe Onomou	Président de la fédération des planteurs de Café de Guinée	

Dr.Mme Fatoumata Binta Diallo	Directrice Nationale Adjoint	Service National de l'hygiène Publique
Dr. Sangaré GB'ATO	chargé de l'hygiène de milieu	
Dr. Robert Camara	Directeur National	

List of persons met - Liberia

FIRST NAMES & SURNAME	Title & Organisation
Florence A. Chenoweth, PhD	Minister, Ministry Of Agriculture (MOA)
Dr. Moses M. Zinnah	Coordinator, Project Coordination Unit/MOA
Gregory Taplah,	Head/Crop Resource Division /MOA
Augustus B.G. Fahnbulleh	Director, national Quarantine & Environmental Services
A. Richelieu Mitchell, Sr	Acting Deputy Minister for Extension/MOA
Ben Karmorh	Manager, Monitoring & Assessment /EPA
Dr J.Q. SUBAH	Director, CARI
G. Momoh Tulay	Register General/Cooperative Development Agency
Harris B. Wennie	Program manager/ Cooperative Development Agency
Dr. Sizi Z. Subah	Agro-consultant/Greenstar Inc
Dr. Windfred N.O. Hammond	Resident representative/FAO

List of persons met, consulted – Sierra Leone

FIRST NAMES & SURNAME	Title & Organisation
DR. Alfred Dixion	Director General, Sierra Leone Agricultural Research Institute
Mr. Patrick S. George	Liaisons Officer, Sierra Leone Agricultural Research Institute
Mr. Syril S.J. Jusu	Ag. Executive Director, Sierra Leone Environment Protection Agency
Mr. Edwin Baimba	Ag. Director, Sierra Leone Environment Protection Agency
Mr. Momodou Bah	Ag. Deputy Executive Director, in charge of Field Operations and Extensions and EIA's, Sierra Leone Environment Protection Agency
Dr. Sisay	Honorable Minister of Agriculture and Food Security, Sierra Leone
Dr. Sankoh	Director General of Agriculture, Ministry of Agriculture and Food Security, Sierra Leone
Ben A. Massaquoi	Director of Crops, Ministry of Agriculture and Food Security, Sierra Leone
Mr. James D. Spencer	Crop Protection Service, Ministry of Agriculture and Food Security, Sierra Leone
Chief Jusuf S. Sankoh	National Administrative Secretary, National Association of Farmers Sierra Leone (NAFSL)
Hassan Mansary	Organizing Secretary, (NAFSL)
Andrew R.C. Conteh	National Secretary General, (NAFSL)
Momodou N.Massaquoi	Research, Monitoring and Evaluation Officer (NAFSL)
Chief Ya Alimamy Manso Kamara	Coordinator Amrafa Women's Farmers Cooperative, NAFSL

List of persons met- Togo

FIRST NAMES & SURNAME	TITLE & ORGANISATION
Dr. Comlan Atsu AGBOLI	Directeur Général ITRA
Kodjo LABARE	Directeur Technique ITRA
DR. Adou Rahim Assimou	ITRA
Dr. KPEMOA	Chercheur/ITRA
Martin Ayéfouni ALE GONH-GOH	Directeur Général/ICAT
Ambroise FANTCHEDE	Directeur des Opérations/ICAT
Mme EWOVOR AKUWAWI	Directrice des Etudes et Conseils/ICAT
AROUKOUN Akla Esso	Directeur Général Agriculture
GOGOVOR Yawo Séfé	Directeur DPV/MAEP
NADJO N'Ladon	Expert en Toxicologie de l'Environnement/DENV/MERF
LEMOU TOYI	Zootechnicien/Direction Elevage
Dr. ABBEY Georges	Directeur Adjoint Ecole Supérieur Agronomie
Dr. TCHALA WIDI	Chef Département Production Végétale/ESA
Arthur ZOAN	Coordination Togolaise des Organisations Paysannes et de Producteurs
OBOUSSOUMI Komlavi Eloi	Technicien Supérieur de Santé/PNLP

Appendix 5: Bibliography

- Plan Cadre de Gestion Environnementale et Sociale du PPAAOP 1 (Sénégal, Mali et Ghana), CORAF, 2007
- Manuel d'Evaluation Environnementale. Vol.1 : Politiques, procédures et questions intersectorielles ; Banque mondiale / Secrétariat francophone de l'Association Internationale pour l'Evaluation d'Impacts ; Montréal, 1999
- Manuel d'Evaluation Environnementale, Vol.2 : Lignes directrices sectorielles Banque mondiale / Secrétariat francophone de l'Association Internationale pour l'Evaluation d'Impacts, Montréal, 1999
- Manuel Opérationnel de la Banque mondiale – Politiques Opérationnelles, Banque mondiale, Washington, 1999

Benin

- Textes législatifs et réglementaires du Ministère de l'Agriculture, de l'Elevage et de la Pêche au Bénin : SPVCP, 2009.
- Rapport Intégré sur l'Etat de l'Environnement au Bénin : ABE 2009
- Répertoire des fiches techniques « environnement » MAEP/DICAF Bénin 2010
- Plan d'action de lutte contre les sauteriaux et les cantharides dans les communes du Département de l'Alibori ; MAEP/SPVCP Bénin, 2010
- Plan d'action de lutte contre les sauteriaux et les cantharides dans les communes du Département de l'Alibori ; MAEP/SPVCP Bénin, 2009
- Campagne de lutte contre le criquet puant dans les départements du Sud bénin ; MAEP/SPVCP, Bénin 2010
- Guide Général de réalisation d'une étude d'impact sur l'environnement : Agence Béninoise pour l'Environnement ; Février 2001
- Profil Environnementale du Bénin Rapport Final : octobre 2006 ;
- Sites Web Ministère de l'environnement et de la Protection de la Nature, Ministère de l'agriculture, de l'Elevage et de la Pêche, gouvernement du Bénin.
- Loi Cadre dur l'Environnement en République du Bénin N° 98-030 du 12 février 1999
- Rapport d'inventaire du Stock résiduel d'endosulfan ; SPVCP 2010
- Plan Stratégique de Relance du Secteur Agricole MAEP/Bénin ; version relue provisoire septembre 2009
- Document de Formulation du Programme de Productivité Agricole en Afrique de l'Ouest (PPAAO/WAAP) du Bénin ; Draft décembre 2009
- Projet d'Urgence d'Appui a la Sécurité Alimentaire (PUASA), Cadre de Gestion Environnementale et Sociale (CGES), Issa maman-Sani, 2009

Guinea

- Dr THIERNO HAMIDOU BALDE, Juin 2008, Chef section défense des cultures et des Stocks/Snpv/Dna.Conakry, Communication sur les Capacités Nationales pour la Gestion effective des pesticides en République de Guinee destinée au Bulletin de gestion des pesticides en Afrique de l'Ouest ;
- Dr THIERNO HAMIDOU BALDE, Juin 2008, Situation actuelle de la protection des végétaux en république de Guinée
- Programme Nationale de Recherche Développement (Programme de Productivité Agricole de la Guinée) 2009-2015

- 17 au 23 Novembre 2008, Rapport de Formation des Formateurs et des Planteurs sur l'Identification, la Détection, le Suivi des Populations des Mouches des Fruits et les Techniques de Lutte, Atelier de Foulaya, GUINEE
- Avril 2005, Cadre National de Biosécurité, Ministère de l'environnement
- 2007, le Plan d'action National d'Adaptation aux changements climatiques (PANA)
- Le code sur la protection et la mise en valeur de l'environnement
- Le document de politique nationale de l'hygiène publique en guinée
- Etude d'Impact Environnemental Programmatique de la Cogestion des Forêts Classées de Guinée
- Septembre 2006, Etude portant sur la législation guinéenne en matière de gestion des ressources en eau et de l'environnement, Maître Amadou DIALLO ;
- Juin 2009, Quatrième rapport national sur la mise en œuvre de la convention sur la diversité biologique en guinée
- Novembre 1997, Monographie nationale sur la biodiversité biologique
- Juin 1999, Etude de capitalisation sur les dynamiques d'organisation paysanne en guinée

Liberia

- Annual Report of MOA
- A Livelihoods Analysis of Coastal Fisheries Communities in Liberia, Moustapha KEBE, Livelihoods Expert Petter Jern, Socio-Economist, May 2008
- Environment protection and management law of Liberia, Monrovia, Liberia, April 30, 2003
- The Environment Protection Agency (EPA) Act (Law, 26/11/ 2002).
- The Environment Protection and Management Law (Law, 26/11/ 2002).
- The National Environmental Policy Act (Law, 26/11/ 2002).
- Environmental Impact Assessment - Procedural guidelines, 2006:
- Conservation of the Forests of the Republic of Liberia (Law, 1953).
- Supplementary Act for the Conservation of Forests (Law, 1957).
- The Act that created the Forestry Development Authority (Law, 1976)..
- Public Health Act (Law, 1976)
- The Natural Resources Law of Liberia (Law, 1979).
- Wildlife and National Parks Act (Law, 1988).
- National New Forestry Reform Law (Law, 2006).

Sierra Leone

- Sierra Leone Agricultural Research Institute, Operational Plan 2008-2012.
- Sierra Leone Agricultural Research Institute, Strategic Plan 2008-2017.
- Sierra Leone Agricultural Research Institute, Summary Report of Research and Development Activities conducted in2009/2010 and Research and Development Activities Planned for 2010/2011.
- Sierra Leone Agricultural Research Institute, Briefing Report, March 2009.
- Crop Production Guidelines for Sierra Leone, July 2005.Ministry of Agriculture Forestry and Food Security , Agricultural Research Coordinating Council, Institute for Agricultural Research, Rice Research Station, Njala University College.
- The Sierra Leone Agricultural Research Institute Act, 2007.
- National Association of Farmers of Sierra Leone, 2003 Elections Results
- National Sustainable Agricultural Development Plan (NSADP), 2010- 2014.

- Environmental Protection Act, 2000.
- Environment Protection Agency, 2008.
- National Environmental Action Plan, 1995.
- National Environmental Policy 1995.
- National Environmental Strategic Plan, 1994.
- Environmental Impact Assessment, Procedures and Guidelines, 1995.
- The Sierra Leone Agricultural Research Institute Act, 2007.
- Environmental Protection Act, 2000.
- Environmental Protection Agency, 2008.
- The Import Permit Act 1974

Togo:

- République du Togo, Mars 2008, Stratégie intérimaire de réduction de la pauvreté, Togo
- République du Togo /PNUD, Avril 2007, Stratégie Nationale axée sur les OMD, Togo
- Ministère de l'Environnement et des Ressources Forestières, 2007, Programme national de gestion de l'environnement, Togo
- République du Togo/ Ministère de l'agriculture, de l'Elevage et de la pêche, Juin 2004, Stratégie de croissance du secteur agricole et rural, Togo
- Ministère de l'Environnement et des Ressources Forestières/PNUD/FEM, Juillet 2008, Stratégie nationale de renforcement des capacités pour la gestion de l'environnement, Togo
- Ministère de l'Environnement et des Ressources Forestières, Mai 2008, Loi cadre sur l'environnement, Togo
- Ministère de l'Agriculture, de l'Elevage et de la Pêche/FAO, Septembre 2008, Programme National de Sécurité Alimentaire (PNSA), Togo
- Ministère de l'Environnement et des Ressources Forestières, 2005, 3ème rapport national de mise en œuvre de la convention des nations unies sur la lutte contre la désertification, Togo
- Ministère de l'Environnement et des Ressources Forestières, 1998, Politique nationale de l'environnement, Togo
- Ministère de l'Environnement et des Ressources Forestières, 2003, Stratégie de conservation et d'utilisation durable de la diversité biologique, Togo
- Ministère de l'Environnement et des Ressources Forestières, 1999, Plan national d'action pour l'environnement du Togo, Togo
- République du Togo, Gouvernement du Togo PNUD/DAES/FAO, Juin 2005, Politique et Stratégies Nationales pour la Gestion Intégrée des Ressources en Eau (GIRE) au Togo. Volume 2/3. Propositions de Politiques et de Stratégies et Plan d'actions, Togo
- Gouvernement du TOGO, Mai 2008, Plan intérimaire d'Actions prioritaires (PIAP) 2008-2010, Togo

Appendix 6: Terms of Reference of PPMP

a) Introduction, Context of Study and Description of Project Component

The West Africa Agricultural Productivity Programme (WAAPP), funded with support from the World Bank seeks to contribute to productivity and agricultural competitiveness through four (4) components: Regional Cooperation in generation and dissemination of technology, Centres of excellence; Technology Generation, Coordination, management, monitoring and evaluation. The first phase of WAAPP covered three countries (Ghana, Mali, Senegal). The programme aims at widening its scope of intervention to cover all the ECOWAS member countries by the end of the programme.

WAAPP 1C, the subject of the present study, concerns 5 countries: Liberia, Guinea, Sierra Leone, Togo, Benin.

The second phase, while it depends on the structure and implementation of the first phase, is a phase for deepening and broadening the accomplishments of Phase 1. Not only does it enable to strengthen the favourable conditions for dissemination and the monitoring and evaluation of gains, it will mainly focus on strengthening National Specialization Centres (NSC) launched during the implementation of WAAPP 1A. The second phase also helps to systematize the integration of the competitive agricultural grant scheme guided by the request and adoption on a larger scale of agricultural technologies. Phase 2 includes four main components described as follows:

• Component 1: Enabling conditions for regional cooperation in the generation and dissemination of technologies. This component seeks to strengthen mechanisms and procedures for the dissemination of technologies to enable countries to fully benefit from regional cooperation in technology generation. It uses achievements as a springboard, and will therefore be built on the achievements of the first phase of WAAPP to better support the improvement and alignment of national standards and regulations with those of ECOWAS.

Specifically, this component supports the following key areas: (i) the establishment of common regulations on genetic materials, pesticides and other crop protection products (CPP) at the ECOWAS level, (ii) a common framework for intellectual property rights (IPR) and other rights, such as farmers' rights and Geographical Indication (GI), (iii) the creation of national committees for recording and intellectual property rights for genetic material and pesticides in the participating countries, (iv) strengthening information systems on agricultural technologies and research expertise at the regional level, (v) the sharing of knowledge on adaptation to climate change.

• Component 2: Strengthening the National Centres of Specialisation (NCS). This component aims at strengthening the alignment of national priorities with regional priorities within the national agricultural research systems of participating countries (NARS).

• Component 3: Financing of the generation and adoption of technology based on demand.

• Component 4: Coordination, management, monitoring and evaluation. The sub-regional coordination of the Project is provided by the CORAF.

b. Purpose of Consultancy

Context:
In accordance with the operational directives of the World Bank, the project is classified under the category "B" of projects subjected to prior environmental assessment. The implementation of the project's activities will certainly benefit the local populations and, if adequate measures are not taken that will generate negative effects in certain cases at the environmental and social level. The project must take into consideration these predictable negative impacts in the planning, realization and implementation of these investments.

The study aims at ensuring the enforcement of national legislative and regulations measures in impact assessment on one hand, and the consideration of the World Bank's safety policies, on the other hand. This environmental assessment should, in addition help to prepare a Pests and Pesticide Management (PPMP) so as to avoid the potential negative effects but also to consolidate in a sustainable manner the positive impacts that the implementation of the project's activities would generate.

The study falls within the framework of the requirements of the Operational Policy (OP) 4.09 and parasite control. The application of the environmental assessment of projects which include parasite control such as applicable to agricultural development projects which could eventually increase the acquisition and use of pesticides by farmers, as could be the case with WAAPP. This could happen for the following reasons:

- Increased use of improved technologies by farmers, particularly sowing materials and modern agricultural inputs including pesticides;
- Increase in the production of certain target crops;
- Increase in service provision in the public and private sectors; and
- The proliferation of disease vectors such as malaria caused by (anopheles) mosquitoes, for example, as a result of the development of intensive irrigated agriculture.

To achieve these objectives we will have significant implications for the management of enemies of crops and a potential increase in the concerns over the risks to human health and the environment.

Basic principles

The management of the environment under WAAPP 1C is special at three levels: (i) Plurality of the countries of intervention (9 countries targeted; (ii) Plurality of the stakeholders concerned (Research Institutes, agricultural councils, Producers' Organizations, state-owned technical services); Plurality of projects to be financed (research, extension, agricultural practice, etc).

In this report, the Consultant must conduct the PPMP study with consideration for the need to (i) carry out a capitalization of gains; (ii) ensure that the PPMP is fitted into existing programmes; (iii) put in place a mechanism for information exchange and sharing and practice of environmental management between the stakeholders.

Mandate of Consultant

The activities relating to the preparation of the PPMP are spelt out in the World Bank's manuals of procedure on this matter and which the Consultant should familiarize himself with (ref. list of documents to be consulted).
The PPMP must be understood and accepted by the authorities and the other national stakeholders. The preparation of the PPMP will involve the participation of the authorities and other stakeholders. It will require a field trip and an end of mission restitution. The preparation of the document can include several of the following elements:

(i) Review of available documents.
(ii) Visit by the authorities and other key players
(iii) Interactions with specialists in management of pests and pesticide and disease vectors (ministries and technical departments).
(iv) Consultation of beneficiaries.
(v) Restitution of conclusion and recommendations.

Within the context of the study, the Consultant must consider the strategies and techniques indicated below:

a. Strategic recommendations to consider in the PPMP

At the strategic level, the Consultant must:

- ***Strengthen the synergies with the programmes, activities and ongoing initiatives on pest and pesticide management***

The PPMP must be further guided in activities which are ongoing or in prospect, in the WAAPP intervention countries and bring "added value" to these initiatives either by completing pertinent but incomplete actions, either by investing in pertinent but new areas that had not known any prior intervention.

The PPMP should be designed as a document for capitalizing on experiences gained, which are ongoing on in perspective countries. For that, it will mean establishing synergies and bridges with the programmes, existing and ongoing initiatives in the following manner: (i) take stock of what exists: what has been planned; (ii) finished the incomplete and unfurnished activities; (iii) correct activities which have not been sufficiently or poorly executed; (iv) support the pertinent but not targeted sectors.

The PPMP must bring together ongoing or planned activities while remaining open and constitute an opportunity for future interventions in pest and pesticide management. From this viewpoint, the PPMP will boost the existing initiatives on which it will be centred, give it added value, to guarantee the synergy, continuity, coherence and sustainability of the proposed measures.

- ***Clarify the expectations and responsibilities of the different actors***

The PPMP to be executed in the extension phase of WAAPP must highlight, in a clear and precise manner, the main expectations of each category of actor, from the researcher to the farmer, in terms of pest and pesticide management. What is at stake, which is also the challenge to be faced, will be to have a PPMP in which all stakeholders find their concerns in order to improve the day to day activities and remove the constraints encountered in pest and pesticide management. This will therefore involve the preparation of an "a la carte" plan in which each of its actors will find his "menu." In addition, the plan must clarify well the institutional arrangements for implementation and follow up.

- ***Ensure the effectiveness of the participation of all actors concerned.***

The implementation of the pest and pesticide management strategy is a concern for many stakeholders and requires the participation of a wide range of national and even international organizations. Several actors are involved as individuals or in partnership in the execution of scheduled activities. The pest and pesticide management requires a frank and close collaboration between the services of the Ministry of Health with other sectors which the Environment, Agriculture and the municipal authorities, as well as the research centres and laboratories, the private sector involved and environmental NGOs, to develop harmonized approaches which deal with development in a healthy environment.

b. Technical recommendations for the PPMP

Orientation to give to the PPMP:
For the future preparatory activities of the PPMP in the extension Phase of WAAPP 1C, the documents must take two major concerns into consideration: (i) the need for pesticide management at the level of research programmes and (ii) needs for the popularization phase. For that, the following specific cases must be considered and analyzed:

b.1. Research projects which test pest control products or techniques:

- ***Research Phase***: The Consultant must indicate (i) the measures to take for testing the methods and products used; (ii) Determine the modalities for the protection and management of residue and empty labels of samples; etc.

- ***Research result dissemination phase***: The Consultant must prepare the PPMP on the basis of the current state (what has been done, what is ongoing and what has been projected; activities to be completed or finished; activities to correct or refine; pertinent not targeted areas to be supported; etc). Measures to be proposed in the PPMP will be developed from this analysis and will be structured into (i) institutional measures (coordination, implementation, consultation, responsibility charts; (ii) legislative and regulatory measures; (iii) technical measures (studies, research, technical measures (training and satisfaction) ; (iv) monitoring and evaluation measures (regular internal and external, national, regional and local monitoring; mid-term and final evaluation).

b.2. Research projects experimenting on agricultural technologies (other than pest control) but whose dissemination can lead to pesticide use:

In this specific case, the Consultant must prepare the PPMP according to the approach indicated above in b.1 2nd paragraph.

Other measures to be considered in the study:

The Consultant must propose in his study:

- A mechanism for assistance to the national coordination structures for WAAP1C in the integration of tools and recommendations of conservation documents in the different project manuals (procedure manuals for the award of contracts, execution, monitoring);

- Strategy for upgrading the officials in monitoring environmental issues of WAAPP 1C before activities take off (workshops, or refresher courses for a better ownership of the PCGES);

Documents to consult
The documents to consult include: World Bank Operational Policy (OP 4.09) and Bank Procedure (BP 4.01) Appendix C and any other pertinent document relating to the PPMP. The Consultant will also consult the documents and policies of the Governments of Nigeria, Sierra-Leone, Liberia, Gambia, Burkina Faso, Niger, Cote d'Ivoire, Togo and Benin in the area of pest and pesticide management policy.

Expected products

The Pest and Pesticide Management Plan (PPMP) will cover the following four major points, namely:

(a) The pest and pesticide management approaches in irrigated and floodplain agriculture and in public health (identification of major pests)
(b) Management and use of pesticides
(c) Regulatory and policy framework and institutional capacities, and
(d) Monitoring and evaluation.

The Consultant's report must also include: 1) An analysis of the existing situation of pests in agriculture and public health; 2) Use of pesticides against these pests; 3) Develop an integrated control strategy against the major agricultural pests; 4) Develop an integrated management of the Anopheles and other mosquitoes; 5) Training plan for officials in charge of the implementation of these strategies; and 6) A budget for the implementation of these strategies.

The Consultant will submit a report in French with an analytical summary in English (electronic copy in word format and with maps, figures and photographs) to the project preparation unit and the World Bank for evaluation. He must incorporate comments and suggestions from the Governments of Nigeria, Sierra-Leone, Liberia, Gambia, Burkina Faso, Niger, Cote d'Ivoire, Togo, Benin as well as the World Bank into the final document to be distributed in these countries and at the World Bank's info shop in Washington.

Organization of Consultancy
The study will be conducted under the supervision of the coordination and preparation of WAAPP and shall be conducted in close collaboration with the national structures in charge of issues of environmental assessment, institutions of research and extension, producer's organizations and active pertinent private operators and the society.

The methodology presented by the consultant and approved by the sponsor of the study is what shall be applied.

Report

The interim report will be submitted to the coordination of the project preparation with a soft copy latest by 20 days after the Consultant has received the notification of the approval. The report will be submitted for the observations of the World Bank. The report must also be

submitted to the major stakeholders concerned (Governments, Technical and Financial Partners, Producers Organizations, Private Operators…) at a workshop.

Comments must reach the Consultant latest a week after the interim report is received by the WAAPP coordination.

The final report incorporating all the comments must be submitted to the coordination for the preparation of WAAPP and with a soft copy within 10 days after receiving the observations.

Profile of Consultant

The candidate retained shall have the qualification of at least a Master of Science (or equivalent) in Science and techniques for pest and pesticide management, biological sciences and health (or equivalent), having at least five years experience in the preparation of Pest and Pesticide Management Plans for World Bank financial projects.

More specifically, the Consultant must have specialized in one or many of the following subjects:

- Pest and Pesticide management in agriculture with experience in integrated management of pests and pesticides
- Management of disease vectors in tropical countries
- Pesticide Management in the developing countries, with an experience in pesticide legislation, risk assessment and pesticide registration and enforcement of legislation on pesticides
- Methods for disseminating pest and pesticide management, and/or participative integrated management of pests and pesticides and disease vectors.

The Consultant must be experienced in the identification and analysis of technical and institutional constraints in agricultural or public health projects in developing countries. The Consultant must show experience in at least five years of preparation of pest and pesticide management plan within the context of the Bank’s safety measures. The duration of the contract will be 45 days from the date of the signing of the contract.