GOVERNMENT OF ANGOLA
MINISTRY OF AGRICULTURE AND FORESTRY
INSTITUTE OF AGRARIAN DEVELOPMENT

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PEST MANAGEMENT / MANAGEMENT PLAN

(PMP)

CPAVCDP-02_24PIU

PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENTS (EIAS) AND ENVIRONMENTAL AND SOCIAL MANAGEMENT PLANS (PGAS) FOR THE

AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT

IN THE EASTERN REGION OF ANGOLA

CABINDA PROVINCE AGRICULTURE VALUE CHAINS DEVELOPMENT PROJECT (CPAVCDP)

República de Angola
Ministério de Agricultura e Florestas

IDA

TECHNICAL

This document refers to the "Pest Management Plan" (D4) of the "Project for the Development of the Agricultural Value Chain in the Eastern Region of Angola – CPAVCDP-02_24PIU". Within the scope of the two Subprojects, the following documents are expected to be submitted:

- D1 - Initial Report (IR)
- D2 - Complaint Resolution Mechanism (RRF)
- D3 - Stakeholder Engagement Plan (EIPP)
- **D4 – Pest Management Plan (PMP)**
- D5 – Environmental and Social Impact Assessment (EIAS)
  Environmental and Social Management Plan (PGAS)
  Waste Management Plan (RMP)
- D6 – Presentation of Reports
- D7 – AIAS and PGAS Final (including PGR)

DOCUMENT CONTROL

CUSTOMER	CPAVCDP-02_24PIU
PROJECT	AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT IN THE EASTERN REGION OF ANGOLA
Subproject 1.	Rehabilitation of Small-Scale Irrigation Systems Resistant to Climate Change. (Lunda Sul)
Subproject 2.	2.1-a) Rehabilitation and equipping of a Research Centre – Lunda Sul (Agrarian Technical Institute of Mona Quimbundo) 2.1-b) Rehabilitation and equipping of a Research Centre – Cuando Cubango (Middle Agrarian Institute of Missombo) 2.2) Construction of a Moxico Research Station (IDA Facilities in Luena)
DOCUMENT	Pest Management Plan
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REV.	DATE	ELABORATE	CHECKED	APPROVED	GENERAL DESCRIPTION
00	20/12/2024	AL	EE/RL	EB	Pest Management / Management Plan
01	08/01/2025	AL	EE/RL	EB	Pest Management Plan , according to the comments made on 01/08/2025 by the Client
02	17/01/2025	AL	EE/RL	EB	Pest Management Plan, added "Types of Pesticides Prohibited for Sale in Angola" (4.1.2) and formatting of the document

EXECUTIVE SUMMARY

The Pest Management Plan (PMP) was developed as an essential component of the Project for the Development of Agricultural Value Chains in the Eastern Region of Angola, with the aim of increasing agricultural productivity, ensuring environmental sustainability and promoting food security for local communities. In line with the National Development Plan (NDP) 2023-2027, the global sustainable development goals and the guidelines of the African Development Bank (AfDB), the PMP presents an integrated and responsible approach to pest management, reconciling modern practices with traditional methods.

Currently, Angola faces significant challenges in pest management, highlighting the dependence on chemical pesticides, the inappropriate use of products, the lack of technical capacity and the resulting negative impacts on public health, the environment and the agricultural economy. Globally, it is estimated that up to 40% of agricultural production is lost annually due to pests, causing losses in excess of US$ 220 billion. In this context, the PMP proposes sustainable strategies and integrated practices that minimize agricultural losses, reduce environmental impacts, and strengthen the resilience of production systems. The main objectives of the PMP are:

- Increase agricultural productivity through sustainable practices;
- Reduce the environmental impact resulting from the inappropriate use of pesticides;
- Ensure public health and food safety;
- Strengthen local capacities through training, supervision and monitoring.

The implementation of the PMP has the participation of several public and private entities, with the Ministry of Agriculture and Forestry (MINAGRIF) being the main responsible for the regulation, supervision and approval of the use of pesticides, in addition to coordinating the national phytosanitary services. The Ministry of the Environment plays a complementary role, inspecting environmental impacts and promoting actions to reduce soil and water contamination. The Provincial Directorates of Agriculture, agricultural research institutions and producer associations also have an active participation in the implementation of the plan, ensuring its implementation in local communities.

Training and qualification are fundamental elements in the PMP. Farmers, extension workers and operators will receive continuous training on:

- Pest identification and integrated control methods;
- Safe and responsible use of pesticides, including proper storage and disposal;
- Good agricultural practices to reduce dependence on chemical inputs.

Leading farmers will be empowered to multiply knowledge in their communities, ensuring the dissemination of best agricultural practices and the promotion of more sustainable and resilient production.

The monitoring of pest management practices will be carried out through regular inspections conducted by the phytosanitary services, in partnership with Water Users Associations (AUA) and agricultural cooperatives. Key evaluation indicators will include:

- Reduction of the use of chemical pesticides;
- Monitoring the incidence of pests and diseases;
- Assessment of the environmental and economic impacts of the practices adopted;
- Community engagement in the implementation of strategies.

Periodic reports will be produced to track progress, identify challenges, and adjust actions as needed. The successes achieved by the PMP will be shared in regional and national meetings, encouraging the replication of good practices in other contexts and agricultural projects in the country.

For the success of the PMP, it will be essential to promote effective collaboration between farmers, the government, research institutions, strategic partners and local communities. It is recommended:

- Invest in continuous training;
- Strengthen inspection and the regulatory framework;
- Promote sustainable alternatives to pesticide use, such as biological control and biopesticides;
- Encourage the integration of innovative technologies with local knowledge;
- Ensure effective communication between all stakeholders.

The PMP – Pest Management Plan reaffirms the Angolan government's commitment to promoting more sustainable, safe, and productive agriculture, strengthening economic diversification, food security, and environmental protection. With its implementation, Angola will be able to consolidate itself as a regional example in the adoption of innovative, resilient and responsible agricultural practices.

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ABBREVIATIONS AND ACRONYMS

BM	World Bank
CRR	Complaint Resolution Committee
DPRM	Cassava Root Rot Disease
DPA	Provincial Directorate of Agriculture
DPP	Public-Private Dialogue
ENP	National Partnership Strategy
EDAs	Agrarian Development Stations
SHE	Environmental Impact Study
FAO	Food and Agriculture Organization of the United Nations
FFS	School at Machamba do Agricultor
GM	Genetically Modified Organism
Goa	Government of Angola
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome
IDA	Agricultural Development Institute
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
MIP	Integrated Pest HandlingM&E Monitoring and Evaluation
MINAGRIP	Ministry of Agriculture, Forestry and Fisheries
MOSAP II	Development and Marketing Project for Small Farmers
MSME	Micro, Small and Medium Enterprises
OBC	Community-Based Organization
ODP	Development Project Objectives
PDAC	Commercial Agriculture Development Project
PMP	Pest Management Plan
PMIP	Integrated Pest Management Plan
PND	National Development Plan
PPCAI	Country Profile for Climate and Smart Agriculture
PAIR	Action Plan for Resettlement
SMEs	Small and Medium Enterprises
UIP	Project Implementation Unit
UPIP	Provincial Project Implementation Unit
QAGA	Environment and Social Management Framework
QPR	Resettlement Policy Framework
R&D	Research and Development
SF	Health and Plant Health
TBT	Technical Barriers to Commercialization
Tor	Terms of Reference
USAID	United States Agency for International Development.

1. INTRODUCTION

1.1. CONTEXTUALIZATION

The Government of Angola (GoA), through its Vision 2050 and the National Development Plan (PND) 2023-2027, reaffirms its commitment to economic diversification, food security and sustainable development. These strategies are aligned with the African Union's Sustainable Development Goals (SDGs) 2030 and Agenda 2063, which seek to transform the agricultural sector into an engine of economic growth, social inclusion, and environmental preservation.

As part of these initiatives, GoA has implemented strategic programs, such as PLANAGRÃO, PLANAPECUÁRIA and PLANAPESCA, which aim to promote commercial-scale agricultural, livestock and fisheries production, decreasing dependence on mineral resources. In this context, the eastern region, which covers the provinces of Lunda Norte, Lunda Sul, Moxico and Cuando Cubango, is considered a strategic territory due to its high agricultural potential, and is often referred to as the "breadbaskets of Angola".

However, pest and disease management is one of the main challenges for food and nutrition security at a global level. Climate change has intensified the spread and severity of these threats, aggravating the situation. According to the Food and Agriculture Organization of the United Nations (FAO), 40% of global agricultural production is lost annually due to pests, resulting in a significant economic impact. Plant diseases cause losses of more than US$ 220 billion per year, while invasive pests add another US$ 70 billion to this worrying picture.

While a focus on modernizing production techniques is essential, the importance of integrating traditional pest management methods with modern scientific practices should not be overlooked. Integrated Pest Management (IPM), which combines innovative approaches with local knowledge, has demonstrated significant effectiveness, especially in countries such as Angola, where there are favorable conditions in terms of fertile land and a favorable climate.

With the expansion of agricultural areas and the introduction of modern technologies, new challenges arise related to inadequate pest management, which can generate negative socio-environmental impacts, such as soil and water contamination, loss of biodiversity, and risks to human health. In addition, the indiscriminate use of chemical pesticides can generate resistance in pests, compromising agricultural productivity in the long term.

In view of this scenario, the Pest Management Plan (PMP) was developed as a strategic response to the risks associated with pests and diseases. The PMP aims to guide the implementation of the Eastern Region Agricultural Value Chain Development Project, ensuring compliance with national regulations and the African Development Bank's (AfDB) Integrated Safeguards System 4 (SIS4), which addresses topics such as pollution prevention and control, hazardous materials, and resource efficiency. Additionally, the PMP is integrated with the Environmental and Social Impact Studies (EIAS) and the Environmental and Social Management Plans (PGAS), highlighting the importance of sustainability in all stages of the project. The preparation of the PMP was conducted through multidisciplinary methodologies, including:

- Specialized literature review;
- Consultations with government departments and technical experts;

- Dialogue with local farming and fishing communities.

As a result, a survey of the most common pests in the project areas and the current control practices adopted by local farmers and aquaculture farmers was carried out.

The plan establishes practical guidelines to minimize adverse impacts of the project, promoting Good Agricultural Production Practices and the responsible use of pesticides, insecticides and herbicides. In addition, it provides training and supervision actions aimed at the safe adoption, correct use and responsible disposal of these products, promoting more sustainable and responsible agricultural practices.

With its implementation, the PMP will not only contribute to the success of the project, but also strengthen Angola's commitments to the SDGs, promoting the country as a regional reference in innovative, safe and sustainable agricultural practices.

1.2. POTENTIAL IMPACTS OF PEST AND PESTICIDE MANAGEMENT ON PROJECT ACTIVITIES

The implementation of modern agricultural technologies and the intensification of agricultural activities under the Agricultural Value Chain Development Project in the Eastern Region of Angola aim to increase agricultural productivity and ensure food security. However, these practices, while beneficial, bring with them significant challenges related to pest management and pesticide use. Poor management of these issues can result in adverse environmental and public health consequences, requiring a careful and integrated approach to mitigation.

The diversification and intensification of agricultural activities can result in changes in pesticide application practices, which, if inadequately managed, can lead to risks and impacts such as:

- Contamination of soil and surface and groundwater;
- Negative impacts on biodiversity, including the elimination of beneficial organisms;
- Pest resistance risks due to the overuse of chemicals;
- Public health problems, such as acute or chronic poisoning in agricultural workers and nearby communities.

To address these challenges, the Pest Management Plan (PMP) was prepared based on the principles of Integrated Pest Management (IPM), promoting sustainable and safe pest and pesticide management. The PMP proposes a holistic approach that includes:

- Analysis of the current state of pests and management practices, identifying the main challenges and methods used in the project area.
- Sustainable, non-chemical methods for pest control, such as the use of biological control, crop rotation, genetic resistance, and cultural practices.
- Strategic guidelines for the implementation of responsible and sustainable agricultural practices, aiming to reduce the use of chemical pesticides and minimize the associated risks.

- A list of permitted chemicals, selected based on international standards, such as those of the World Bank and the World Health Organization (WHO), prioritizing products with low toxicity and lower environmental impact.

Through the adoption and implementation of the PMP, the project seeks to:

- Reduce environmental and public health risks associated with the inappropriate use of pesticides.
- Promote sustainability in pest management by integrating innovative and traditional practices.
- Strengthen local capacity through training and continuous monitoring, ensuring the responsible and effective use of agricultural resources.

Thus, the PMP acts as a strategic instrument to balance the economic and productive gains of the project with environmental preservation and the protection of human health, consolidating a sustainable and resilient approach to pest and pesticide management.

1.3. ENVIRONMENTAL AND SOCIAL CONSEQUENCES OF PEST MANAGEMENT PRACTICES

In Angola, the inappropriate and uncontrolled use of chemical pesticides in pest management has generated significant negative impacts, compromising the sustainability of agriculture, the ecological balance and the health of local communities. The over-reliance on these products, coupled with the lack of efficient regulation, insufficient enforcement, and lack of technical training among farmers, intensifies the adverse consequences.

In places where pest control is largely dependent on the use of chemical pesticides in Angola, the inadequate and uncontrolled application of these products has generated significant negative impacts, compromising the sustainability of agriculture, the ecological balance and the well-being of local communities. This scenario intensifies due to the lack of adequate regulation, insufficient inspection, and lack of technical training among farmers. Among the main environmental and social consequences of these inappropriate practices are:

- **Impact on essential pollinators:** the indiscriminate use of pesticides has caused the death of bees and other pollinators, essential for the reproduction of cultivated plants and for biodiversity. This leads to significant reductions in agricultural yields, compromising productivity and food security.
- **Ecological imbalance:** the elimination of natural enemies of pests, such as predators and parasites, destabilizes the natural balance of ecosystems. This results in the uncontrolled growth of pest populations, creating a vicious cycle that requires increasingly intensive chemical interventions.
- **Pest resistance:** Continuous and repeated use of pesticides encourages the development of resistance in pests. Over time, these species become immune to chemicals, forcing farmers to

increase the doses applied or seek more potent pesticides, amplifying the environmental and economic impacts.

- **Soil and water contamination:** Improperly applied pesticides contaminate soil, water bodies, and groundwater, harming the quality of water resources and the health of ecosystems. Contamination affects not only aquatic species, but also the entire food chain, including humans.
- **Impacts on human health: Farmers** and farm workers often suffer poisoning due to improper handling of pesticides. The effects include acute poisoning, respiratory diseases, neurological damage and even chronic problems, directly affecting the quality of life of communities.
- **Reduction of biodiversity:** the extensive use of pesticides directly impacts local biodiversity, causing the death of sensitive species, especially among aquatic organisms, insects and birds. The reduction of biodiversity compromises essential ecosystem services, such as pollination, natural pest control and soil regeneration.

In the face of these critical challenges, the Pest Management Plan (PMP) proposes an integrated and sustainable approach, based on the principles of Integrated Pest Management (IPM). The PMP prioritizes alternative methods, such as biological control, the use of resistant varieties, cultural management, and improved agricultural practices, aiming to reduce dependence on chemical pesticides. In addition, it promotes awareness and technical training of farmers to ensure the responsible and safe use of these products.

The implementation of the PMP seeks to balance agricultural productivity with environmental preservation, ensuring the rational use of natural resources, protecting the health of local communities, and promoting food security. With integrated, regulated and monitored practices, the project aims to establish a more resilient and sustainable agriculture, capable of facing the challenges imposed by pests without compromising the environment and social well-being.

2. PROJECT DESCRIPTION

2.1 OBJECTIVES, COMPONENTS, ACTIVITIES AND EXPECTED RESULTS OF THE PROJECT

This is a stand-alone investment project designed as a continuation of the Agricultural Sector Reform Programme (ASRP) by the African Development Bank (AfDB). The aim is to strengthen agricultural policies and the business environment, promoting more efficient and sustainable food production, which in turn will contribute to economic diversification and ensuring safe food. The project builds on the institutional advances achieved by ASRP and the technical knowledge accumulated through the Bom Jesus e Calenga Project and the Agricultural Value Chain Project of Cabinda Province, consolidating these experiences to maximize results and impact on agricultural value chains in Angola.

2.1.1 Project Development Objective

The development objective of the project is therefore to strengthen food and nutrition security, increase household incomes, and promote job creation in Angola's eastern provinces, which include Lunda Norte, Lunda Sul, Moxico, and Cuando Cubango. These provinces, recognized as the

"breadbaskets of Angola," have vast agricultural potential and play a strategic role in promoting sustainable food production and the country's economic diversification, aligning with national efforts for sustainable development and social inclusion.

2.1.2 Components

The project will be structured into three main components, each with specific subcomponents and activities to achieve the objectives of improving food security, increasing productivity and strengthening agricultural value chains in Angola's eastern provinces. The components and their respective Activities are described below:

Table 1: Components and Activities

#	COMPONENT DESCRIPTION	SUBCOMPONENT	ACTIVITIES
COMPONENT 1: IMPROVED PRODUCTION AND PRODUCTIVITY			
1	This component aims to increase agricultural productivity and the sustainability of value chains by promoting climate-smart practices and modern technologies.	Subcomponent 1.1: Increasing Agricultural Productivity	• Introduction of improved varieties of food and high-value crops, such as maize, rice, beans, cassava and soybeans. • Rehabilitation of two research centres and construction of a new research station in Moxico province. • Implementation of good soil and water management practices, including the use of certified fertilizers and climate-resistant seeds.
2		Subcomponent 1.2: Climate-Resilient Agricultural Infrastructure	• Development and rehabilitation of irrigation systems to improve drought and flood control. • Preparation and reclamation of farmland to expand cultivation areas. • Construction of seed processing centers to ensure the availability of quality inputs.

#	COMPONENT DESCRIPTION	SUBCOMPONENT	ACTIVITIES
3		Subcomponent 1.3: Resilience of Livelihoods and Ecosystems	• Promoting climate change adaptation in farming communities. • Protection of vulnerable ecosystems in the areas of project implementation.
COMPONENT 2: AGRIBUSINESS AND VALUE CHAIN DEVELOPMENT			
4	This component seeks to integrate smallholder farmers into value chains, strengthening markets and promoting agribusiness as an engine of economic development.	Subcomponent 2.1: Agribusiness Support and Market Development	• Establishment of agribusiness centers in all target provinces, to provide technical and logistical support to farmers. • Creation of marketing contracts between farmers and buyers, ensuring safe markets for agricultural products. • Promotion of the use of organic and inorganic fertilizers, as well as improvement in pesticide management.
5		Subcomponent 2.2: Rehabilitation of Rural Roads	• Rehabilitation of side roads to improve farmers' access to markets. • Involvement of local communities in rehabilitation work, creating employment opportunities.
6		Subcomponent 2.3: Capacity Building and Institutional Strengthening	• Training of farmers in good agricultural practices through Field Schools. • Capacity building of extension workers and strengthening of local agricultural institutions to monitor and implement the project activities.
COMPONENT 3: PROJECT MANAGEMENT, MONITORING AND EVALUATION			
7	This component ensures efficient coordination and monitoring of project progress. Main Activities:	IN	• Recruitment of a specialized technical team for the management and supervision of the project's activities. • Conducting impact studies, audits and regular reports to assess the

#	COMPONENT DESCRIPTION	SUBCOMPONENT	ACTIVITIES
			performance and effectiveness of the actions implemented. • Implementation of monitoring and evaluation systems based on result and impact indicators.

2.1.3 Expected Results

- Increasing the productivity and sustainability of agriculture in the target provinces.
- Efficient integration of smallholder farmers into agricultural value chains.
- Climate-resilient agricultural infrastructure and systems.
- Improving food security, rural household incomes, and employment opportunities in the eastern region of Angola.
- Institutional strengthening and greater efficiency in the management of agricultural and commercial activities.

2.2 SPECIFIC OBJECTIVES AND ACTIVITIES ASSOCIATED WITH INTEGRATED PEST MANAGEMENT

2.2.1 General Objective of the Pest Management Plan

The Integrated Pest Management Plan (PMP) has as its main objective to promote the use of sustainable and socially acceptable practices for pest management, prioritizing environmentally correct and integrated approaches. Likewise, the PMP ensures that the socio-environmental risks associated with the use of pesticides are minimized and kept within acceptable limits for stakeholders, particularly farmers and their families.

2.2.2 Specific Objectives

The Pest Management Plan (PMP) adopts a comprehensive ecological approach, integrating cultural, mechanical, genetic, regulatory, biological, and chemical methods to control pests in a manner compatible with the maintenance of populations. Specific objectives include:

- Establish clear procedures and methodologies on the procurement, transportation, distribution and storage of pesticides to be funded under the Project.
- Ensure the use of appropriate pest control techniques using appropriate technologies recommended in the Project.

- Identify the capacity of the country's regulatory framework and institutions to promote and support safe, effective, environmentally and socially sound pest management practices and provide adequate technical assistance for the successful implementation of the PMP.
- Provide alternatives, for any problems that are considered serious in pest control and/or the introduction of technologies that lead to a significant decrease in pesticide application, through a pest management action plan.
- Develop systems for monitoring and evaluating pesticide use and pest management practices in the agriculture sector.
- Assess the potential economic, environmental and social impacts on pest management practices.
- Mitigate the negative impacts of pesticides on crops, vegetation and livestock production.
- Ensure compliance with national laws, regulations, environmental and social standards of the World Bank.
- Propose a detailed and adequate budget for the effective implementation of the Pest Management Plan (PMP).

This approach aims to create a safe and sustainable environment by balancing agricultural needs with environmental protection and community health.

2.2.3 Justification

The Pest Management Plan (PMP) was developed with the aim of minimizing adverse impacts on human and environmental health, promoting good practices in agriculture, including the rational use of pesticides, insecticides and herbicides. In addition, the plan provides for training and supervision to ensure the safe use and disposal of these products, reducing risks and promoting sustainability.

The African Development Bank's (AfDB) Integrated Safeguards System 4 (SIS4) highlights that projects involving pest management should prioritize Integrated Pest Management (IPM) or Integrated Vector Management (IVM) approaches, which combine diversified tactics and promote the use of biological or environmental control methods, reducing reliance on synthetic chemicals. In addition, SIS4 requires the assessment of the country's capacity in terms of regulatory framework and institutions to promote safe and sustainable pest control, as well as the risks associated with pesticide use, considering the end users and the objectives of the project.

In accordance with these principles, the PMP was structured to meet several fundamental objectives: to analyze the Activities proposed in the project; identify anticipated pest management problems in the areas of operation; evaluate national policies and regulations related to pest management; review existing practices in the country, including experiences in IPM; present a detailed work plan for the

application of the IPM, aiming at greater effectiveness and safety in pest management; and define a monitoring and evaluation plan to ensure the successful implementation of the PMP.

With the expectation of increased use of pesticides and agrochemicals during the project activities, driven by the need to improve agricultural productivity, the PMP was designed to meet the demands of local farmers in a sustainable, adequate, environmentally safe and economically viable manner. The plan is aligned with the AfDB's environmental and social standards, which promote safe and effective pest management practices, prioritizing the use of biological control methods and environmentally sound practices.

In this sense, the PMP offers a framework to integrate these guidelines into the project's actions, ensuring that agricultural activities are carried out responsibly, contributing to sustainable productivity and the preservation of natural resources.

2.2.4 Activities Associated with Integrated Pest Management

Integrated Pest Management (IPM) is an essential strategic approach for the sustainable development of agriculture in Angola, especially in the Eastern Region, which includes the provinces of Lunda Norte, Lunda Sul, Moxico and Cuando Cubango. This region, known for its high agricultural potential, faces unique challenges related to pest management, which require innovative and sustainable solutions to ensure food security and agricultural productivity. To highlight:

- **Dependence on Chemical Pesticides**
    - The prevailing practice of using chemical pesticides reflects the lack of effective and affordable alternatives for pest control. For example, many farmers resort to intensive pesticide use, often without proper technical guidance, resulting in negative impacts on human and environmental health.
    - The indiscriminate application of these products leads to the development of resistance by pests, making chemical control less effective over time and increasing the need for more frequent applications and in greater quantities.
- **Climatic and Geographical Conditions**
    - The region is marked by significant climatic variability, with heavy rainy seasons and periods of drought. These conditions favor the proliferation of pests and diseases, further complicating effective management.

- The diversity of altitudes and microclimates in the different provinces creates a number of challenges for the implementation of uniform pest control strategies, requiring approaches tailored to specific local conditions.

- **Socioeconomic Challenges**
  - Most farmers in the region are smallholders or subsistence farmers, with limited access to financial resources, quality agricultural inputs and modern technology. This limitation restricts the ability to adopt advanced and sustainable agricultural practices.
  - Low education and lack of specialized training among farmers make it difficult to understand and apply integrated pest management techniques, which require specific knowledge and continuous adaptation to field conditions.

- **Limited Infrastructure and Institutional Capacity**
  - Agricultural extension services and local phytosanitary institutions face resource constraints and inadequate infrastructure, which limits their ability to support farmers in implementing IPM practices.
  - The absence of a robust monitoring network and rapid response to pest outbreaks prevents effective preventive and reactive actions, exacerbating the impacts of pests on crops.
- **5. Environmental Pressures and Sustainability**
  - The continued use of chemical pesticides on a large scale poses a significant threat to local biodiversity, contaminating soil, water, and aquatic ecosystems.
  - The need to protect the environment and preserve the health of agricultural ecosystems makes it crucial to transition to more sustainable management practices that reduce dependence on chemicals and promote ecological balance.

These specific challenges of the **Eastern Region of Angola** require an integrated and tailored approach to **Integrated Pest Management (IPM),** which considers local particularities and strengthens institutional and community capacities to ensure sustainable and productive agriculture.

3. CURRENT APPROACHES TO PEST MANAGEMENT IN THE COUNTRY

Pest management in Angola plays a crucial role in strengthening agricultural production, given the sector's strategic importance for food security, rural income generation, and economic diversification. Despite this relevance, the country faces significant challenges arising from the predominant use of chemical pesticides, lack of technical capacity, limitations in infrastructure, and the absence of a systematic adoption of integrated and sustainable pest control practices.

The Angolan agricultural sector has a rich diversity of crops, especially maize, cassava, rice, beans and oilseeds, which represent the economic base of rural communities. However, these crops are often threatened by common pests, such as caterpillars, borers, grasshoppers, and stink bugs, which negatively affect crop yields and quality. The predominant response has been the intensive use of chemical pesticides, chosen for their immediate efficacy and wide availability. However, this practice often occurs without adequate technical support, resulting in serious problems, such as pest resistance to chemicals, contamination of soil and water resources, as well as adverse impacts on human health.

Although there are specific efforts aimed at promoting more sustainable practices, such as Integrated Pest Management (IPM), its application is still limited throughout the country. Factors such as restricted access to alternative inputs, lack of technical knowledge among farmers, deficiencies in rural extension services, and insufficient institutional support hinder the large-scale adoption of biological control methods and cultural practices, such as crop rotation, intercropping, and proper agricultural waste management.

The absence of strict regulation and effective monitoring and inspection systems further aggravates the scenario. Inadequate storage, poor transport and incorrect application of pesticides put at risk not only the environmental quality, but also the health of local communities, which are exposed to acute and chronic contamination. The misuse of empty pesticide containers for domestic purposes is also a recurrent and dangerous practice.

Institutions responsible for agricultural extension face significant limitations in their technical and operational capacity, making it difficult to continuously support farmers in integrated pest management. This institutional fragility prevents the effective dissemination of safer and more sustainable practices, such as the use of biological agents in pest control and the application of agronomic techniques adapted to the local context.

In view of these challenges, it is urgent to implement an Integrated Pest Management Plan (PMP), which proposes viable and sustainable solutions for pest management in the country. The PMP should prioritize the responsible and rational use of pesticides, the strengthening of institutional capacities

and the technical capacity building of farmers, in addition to promoting control alternatives based on biological, cultural and physical methods. The introduction of these practices will contribute to the reduction of environmental and social impacts, the improvement of agricultural productivity and the protection of natural resources.

The effective implementation of the PMP should count on the active participation of all stakeholders, including the government, farmers' associations, phytosanitary services, research institutions and strategic partners. Only through an integrated and collaborative approach will it be possible to ensure a more resilient, sustainable and productive agriculture, positioning Angola on the path to food security and balanced economic development.

3.1 DESCRIPTION OF TARGET CROPS AND ASSOCIATED PEST PROBLEMS

The use of pesticides is directly related to agricultural activities in Angola, being fundamental for the control of pests, diseases, nematodes and weeds. In the context of the project, the target crops include maize, several varieties of beans, horticulture, fruits and cassava, which play a central role in both household food security and the rural economy. Cassava, in particular, has been gaining greater relevance due to its growing connection with industrial demands, while other crops, such as cereals and vegetables, meet the needs of the local and national market.

These crops face important challenges, mainly due to the presence of forecasts and diseases typical of the Angolan context. The most common statements include grasshoppers, caterpillars, borers, and stink bugs, which directly affect crop productivity[1]. Herbs also represent a cross-cutting problem, as they compete with crops for nutrients, water and light, and are found in practically all cropping systems. Diseases such as leaf spots, rots and rusts further impact crop yields.

Farmers in Angola can be classified into three main categories: family farmers, MSMEs (Micro, Small and Medium Enterprises) and large operators. Each group adopts different strategies for pest management, reflecting their economic, technical and access to input capabilities. Family farmers often rely on traditional practices and limited use of inputs due to financial constraints and lack of technical assistance. MSMEs and large operators, especially in more mechanized and monoculture areas, tend to use more agrochemicals, such as fertilizers, herbicides, insecticides, nematicides and fungicides.

[1] See the list of pests and diseases in Annex 1

The agricultural intensification expected under the project, especially among family farmers and MSMEs, may cause an increase in the use of chemical inputs. This trend has already been observed in previous projects, such as PDAC, MOSAP2 and MOSAP3, and is likely to continue if adequate pest management and control strategies are not implemented. The indiscriminate use of pesticides poses a significant risk to human health and the environment, exacerbating problems such as pest resistance, contamination of soils and water resources, and loss of biodiversity.

The pests faced in the Angolan context can be grouped into three main categories: insect pests, plant diseases, and weeds. Monocultures, especially cereals such as corn and rice, are the most susceptible to attacks by granivorous birds, rodents and locusts. Higher altitude regions, such as the Central Plateau (Huambo, Bié, Malanje and Huíla), benefit from lower temperatures, which favor natural pest regulation and reduce their incidence. In contrast, lower altitude areas, with warmer and rainier climates, present favorable conditions for the development of pests and diseases, requiring more robust control strategies.

The success of pest management, therefore, will depend on an integrated approach that combines traditional and modern methods, prioritizing cultural practices, biological control, and the rational use of chemicals. The implementation of effective strategies within the project will contribute to minimizing the negative impacts of pests and diseases, ensuring agricultural productivity and environmental sustainability in the target regions.

Table 2: Main target crops and the associated pest problems

#	CULTURE NAME	IMPORTANCE	ASSOCIATED PRAGUE	PROBLEMS
1	Corn	Main staple of the Angolan diet and widely cultivated crop in all regions of the country.	Fall armyworm (Spodoptera frugiperda)	Significant damage to leaves and ears, reducing productivity.
			Locusts	They consume large amounts of vegetation, affecting the growth of the plant.
			Drills	They attack the stem and ears, compromising the quality of the product.
2	Cassava	Vital subsistence crop, especially in regions with less fertile soil.	Red spider mite (Mononychellus tanajoa):	It affects the health of the leaves by reducing the capacity for photosynthesis.

#	CULTURE NAME	IMPORTANCE	ASSOCIATED PRAGUE	PROBLEMS
			Whitefly (Bemisia tabaci)	It transmits viral diseases, such as cassava mosaic, which drastically reduces yield.
			Root Drills	They directly attack the roots, causing rot and post-harvest losses.
3	Rice	Essential for food security, especially in irrigated areas of the country.	Rice Borers	They attack the stems, impairing the filling of the grains.
			Grain stink bug	It damages the forming grains, resulting in loss of quality.
			Aphids	They transmit diseases that affect plant growth.
4	Beans and Other Legumes	An important source of protein for the population and rotational culture that enriches the soil.	Weevil (Callosobruchus spp.	It mainly affects the grains during storage.
			Leaf miner	It attacks leaves and shoots, reducing production capacity.
			Aphids	They suck the sap, transmitting viral diseases.
5	Oilseed Crops (Soybeans and Peanuts)	Used for oil production, animal feed and export.	Nematodes	They affect the roots, impairing the absorption of nutrients.
			Leaf beetle	It consumes the foliage, reducing photosynthetic capacity.
			Defoliating caterpillars	They compromise the development of plants.
6			Tomato moth (Tuta absoluta)	Severe damage to leaves and fruits, causing great losses.

#	CULTURE NAME	IMPORTANCE	ASSOCIATED PRAGUE	PROBLEMS
	Vegetables (Tomato, Onion and Pepper)	Essential components of the diet and source of income for smallholder farmers.	Aphids and whiteflies	They transmit viruses and reduce the overall health of plants.
			Leaf caterpillars	They attack leaves and fruits, damaging quality.
7	Fruit Trees (Banana, Pineapple and Mango)	Products in high demand in the domestic market and export potential.	Fruit fly	It causes direct damage to fruits, reducing their commercial quality.
			Stem borers	They compromise the structure of the plant, reducing its longevity and productivity.

Source: adapted by Engconsult, 2024

The implementation of an Integrated Pest Management Plan (PMP) is essential to mitigate the challenges faced by the agricultural sector in Angola, promoting sustainable practices that protect crops and ensure food security in the country. Although pesticide use is still considered low in several regions, the expansion of cultivation areas, particularly in monocultures, can intensify the incidence of pests and increase dependence on chemicals for control. This situation demands a strategic approach that favors the sustainable and rational use of inputs, mitigating negative impacts on the environment and human health.

Among the practices preferred by farmers are crop rotation, intercropping and the use of natural plant-based remedies, methods that have been shown to be effective in controlling pests and increasing soil fertility. However, these traditional practices have lost ground due to the introduction of modern methods, the lack of incentive for their preservation, and the absence of integration with new technologies. To reverse this trend, it is necessary to strengthen farmers' knowledge and skills by combining traditional practices with technological innovations in a sustainable way.

The project region, characterized by high population density and favorable climatic conditions, concentrates the production of essential crops such as maize, cassava, beans, potatoes and horticulture. Most farmers, however, are smallholders who face challenges such as limited capacity, lack of access to technologies, and low technical knowledge in improved farming practices. In this scenario, the Farmer Field School (ECA) approach has proven to be an effective tool, promoting

participatory learning and facilitating the adoption of sustainable and technological agricultural practices, especially in corn, beans, cassava, and potato production systems.

For the success of the project, it is essential to expand thematic training through ECAs, strengthening partnerships with international Integrated Pest Management (IPM) groups. These collaborations will bring technical expertise, resources, and the development of national IPM policies, aligned with international conventions on the responsible use and management of pesticides. Strengthening local and national capacities will be key to ensuring the implementation of safe and effective pest control practices.

Despite the proven potential of traditional practices, such as intercropping, crop rotation, and the use of natural remedies, the incentive to preserve this knowledge has been limited. Agricultural research and extension, both "*on farm*" and "*on station*", must integrate and promote the solutions that work, combining modern and traditional practices in a holistic approach. There are already positive experiences in several communities where farmers use crop rotation and intercropping techniques for effective insect and fungal control. These practices should be strengthened and applied on a larger scale within the project.

Production modalities in Angola are diverse, ranging from small farmers who produce for self-consumption to small and medium-sized producers who supply regional markets or work as subcontractors to large operators. The experience accumulated with previous initiatives, such as MOSAP and PDAC, is fundamental to guide the project towards the efficient and safe use of fertilizers and pesticides. Technology Recommendations (Technology Charters), which detail specific operations and management systems, including pest management, should be widely disseminated to improve productivity and ensure the sustainability of crop production.

In summary, the project should prioritize the training of farmers, the dissemination of sustainable cultural practices, and the integration of advanced technologies with local knowledge, seeking a balance between innovation and tradition. The dissemination of sustainable agricultural practices, the strengthening of international partnerships, and the implementation of effective strategies are crucial actions to ensure pest management in an environmentally safe manner, promoting sustainable and lasting agricultural development in Angola.

3.2 CURRENT APPROACHES TO PEST MANAGEMENT IN ANGOLA

The main objective of pest management should not be the total eradication of organisms, but rather the maintenance of pests, diseases and weeds at levels below a harmful economic and environmental

threshold. Management should be carried out through an integrated process, combining chemical and non-chemical approaches, minimizing the impacts of pests and control measures on the environment. In an Integrated Pest Management (IPM) or Integrated Vector Management (IVM) approach, pesticides should only be used as a last resort, when other management practices prove ineffective (DASS, 2016).2

Integrated Pest Management (IPM) uses sustainable methods, such as natural predators, pest-resistant plants, and cultural techniques, to preserve a balanced environment and reduce reliance on harmful pesticides (Radcliffe et al., 2009). Developing effective strategies is essential to mitigate the impacts of insects, pathogens, and weeds, which pose a constant threat to agricultural productivity and crop quality. The reliance on chemical methods as the only solution has resulted in problems such as environmental degradation, pest resistance, food contamination, and accumulation of toxic waste. Therefore, it is essential to develop management systems based on ecological principles, which promote sustainable agricultural production and protect the balance of nature (Kogan, 1998).

GIP's ecological approach combines physical, cultural, biological, and ultimately chemical methods to sustain agricultural productivity and ecosystem health. According to Altieri et al. (2005), IPM programs should, on the one hand, control pests and, on the other hand, encourage the growth of beneficial organisms. For this, the following points should receive special attention:

- Understanding of the ecological relationships between host plants and management practices, such as biological, cultural and plant resistance.
- Integration of biological, chemical, cultural and physical components for greater effectiveness.
- Minimization of economic, environmental and human health risks, ensuring long-term sustainability.

Currently, alternative ecological methods, such as botanical pesticides, attractants, repellents, insect growth inhibitors and biological control, have gained prominence as effective and environmentally correct solutions for pest management (Kogan, 1998). IPM strategies have expanded, considering a broader view of agroecosystems and incorporating ecological principles that encompass biological, physical, chemical and cultural tools, with the aim of promoting favorable economic, ecological and sociological outcomes (Fox et al., 1991).

[2] EHS Guidelines for Annual Crop Production, 2016. (https://www.ifc.org/wps/wcm/connect/2db115fe-4842-4a32-86ed-c9d659a0ea38/English_2016_Perennial+Crop+Production_EHS.pdf?MOD=AJPERES&CVID=lffbDhw)

In addition, in ecology many ecological alternative methods have been discovered, such as botanical pesticides, attractants and repellents, insect growth inhibitors and biological control. PMP strategies have gained increasing attention in recent years as a potential means of reducing commodity losses to pests (Kogan 1998).

Currently, the development of ecologically-based PMP systems that take a broader view of all pests within an agroecosystem context is emphasized. This emphasis is being placed more on ecological principles and their applications in pest management strategies in the context of agricultural systems as a whole, representing a sustainable approach to pest management combining biological, physical, chemical, and cultural tools to ensure an economically favored, ecological, and sociological consequences. Thus, new pest management systems must be developed that are effective in the long term, cost-effective and not harmful to human and environmental health (Fox et al 1991).

Generally, smallholders use several combined methods and techniques, including the Pest Management Plan (PMP) to control crop pests and diseases. These control methods include:

- Traditional or cultural control methods: burning of old-growth crop debris to control stem borer pupae and soil insects, early planting and timely weeding to control Striga weeds and other pests, hand harvesting and burning of adult beetles, pulling out Striga weeds before flowering, use of repellents and noise devices to scare away village weaver birds.
- Crop rotation, fallow, good seed selection and stock, seed treatment, recommended spacing and optimal plant population densities, application of recommended and affected fertilizer and fertilizer dosing rates, use of resistant varieties, early harvesting, burning of old and affected stubble, and timely harvesting.
- Physical and mechanical control methods: regular monitoring of pest populations, manual harvesting, trenching and burial for caterpillar and fall armyworm control, and use of centipede baits. Plowing to expose the pods of the grasshopper and pupae of other insect pests.
- Use of chemicals should be the last option of control measure. If necessary, selective insecticides should be used to avoid the elimination of natural enemies and negative impacts on the environment and public health.

- Natural compounds from plant sources may have an advantage over conventional fumigants in terms of low toxicity to mammals (not true in all cases), rapid degradation, and local availability. Plant-based compounds can only be used for small-scale applications or for space treatments. Validation studies will be needed to fully determine the potential for biological controls as substitutes for insecticidal protectants, good hygiene in the grain warehouse or storage depot is important to maintain grain and seed quality (Shadia 2011).
- Use of Neem Powder and Plastic Containers to protect seeds from infestation.
- Use PMP methods by combining and integrating more than one method to control pests and diseases.
- Research and development of alternative control methods are being disseminated using the ECA approach to disseminate appropriate pest and pesticide management practices.
- Use of chemicals should be the last option of control measure. If necessary, selective insecticides should be used to avoid the elimination of natural enemies and negative impacts on the environment and public health.

Integrated pest management approaches in Angola reflect the importance of combining ecological, cultural, and modern methods to control pests sustainably. The Pest Management Plan (PMP) offers a comprehensive framework that not only addresses current challenges but also promotes sustainable and resilient agricultural practices. The emphasis on the integration of biological and cultural methods, with the judicious use of pesticides, is essential to ensure long-term productivity and preserve environmental and human health in the country.

3.3 PRACTICAL EXPERIENCE IN INTEGRATED PEST MANAGEMENT IN THE COUNTRY

In Angola, pest management practice is still largely based on the use of imported chemical pesticides, with emphasis on products such as *Eforia 045 ZC*, *Thiodan 35% EC*, *Actellic Super*, among others. However, the excessive dependence on these products has generated challenges such as environmental degradation, pest resistance, and soil and water contamination. These challenges are exacerbated by the irregular entry of unregistered pesticides into the country, especially in remote areas due to limited border enforcement.

The use of pesticides is directly related to agricultural activities, particularly in plant production, for the control of pests, diseases, nematodes and weeds. In the context of the Pest Management Plan (PMP), the main priority crops include corn, several varieties of beans, horticulture and fruits, as well

as cassava, which plays a key role in the family farming sector and has shown increasing demand due to its integration with food industries. These crops face significant challenges due to the incidence of pests and diseases typical of the Angolan context, such as caterpillars, borers, stink bugs and fungi, which compromise productivity. The management of these pests is carried out by three main categories of farmers: family farmers, who use traditional practices and have limited resources; micro, small and medium-sized enterprises (MSMEs), which are beginning to adopt modern technologies, but face challenges in training and access to inputs; and large producers and commercial operators, who have greater access to advanced technologies and agricultural inputs.

The agricultural intensification expected in the project, especially among family farmers and MSMEs, should expand the use of inputs such as fertilizers, herbicides, insecticides, nematicides and fungicides. Experiences observed in previous projects, such as PDAC, MOSAP2 and MOSAP3, show that the increase in the use of these products can generate negative impacts on the environment and public health if there are no adequate controls and sustainable practices. The pests faced in the country can be classified into three main categories: insect pests, such as caterpillars, grasshoppers, and bed bugs; plant diseases, caused by fungi, bacteria and viruses; and weeds, such as weeds, that compete for nutrients and water. Climatic and geographical factors directly influence the distribution and severity of pest attacks. Regions of higher altitude and cold and dry seasons offer favorable conditions for the natural regulation of pests, while lower areas and with hot and rainy climates face greater challenges, as these conditions favor the proliferation of harmful organisms.

Although pest attack is generally moderate in several project target areas, specific infestations have been recorded, especially in maize and bean monocultures, which are susceptible to pests such as granivorous birds, rats and grasshoppers. Agricultural intensification without integrated management strategies can exacerbate these problems, leading to reliance on chemical control measures and the emergence of pest resistance. Several practical experiences have been implemented to address these challenges, with emphasis on the use of cultural and traditional methods, such as crop rotation, intercropping, use of natural repellents, and manual pest removal. The use of biopesticides, such as Neem powder, has also been tested with promising results on a small scale. In addition, approaches such as Farmer Field Schools (ECA) have proven effective in disseminating knowledge about Integrated Pest Management (IPM) and strengthening local capacities.

Despite these advances, practical experience in pest management still faces significant challenges in Angola, such as limited access to alternative inputs, lack of technical training, inadequate use of pesticides, and insufficient enforcement. The implementation of the Pest Management Plan (PMP) is an opportunity to strengthen sustainable practices and disseminate the use of integrated methods on

a large scale. It is recommended to invest in continuous capacity building, conduct regular monitoring of control practices, promote the use of eco-friendly alternatives such as biopesticides and biological control, and strengthen regulation and enforcement of pesticide use. By combining traditional knowledge with modern practices, Angola will be able to move towards a more resilient, sustainable, and productive agricultural model, contributing to food security, environmental protection, and long-term economic development.

3.3.1 Trends and Challenges

The increase in cultivated areas, especially in monocultures such as corn, beans and vegetables, has the potential to intensify the incidence of pests, such as granivorous birds, grasshoppers and rats, which cause significant losses in cereal production areas and in low-lying regions. Monoculture favors the proliferation of pests due to the continuous supply of food and shelter, which requires effective control solutions.

Among smallholder farmers, however, pesticide use is still limited by several factors, such as financial constraints, lack of access to suitable products, and a strong tradition of agricultural practices based on non-chemical methods such as crop rotation and manual pest control. This limitation, while reducing the risks associated with the indiscriminate use of agrochemicals, also restricts the potential for increased productivity and efficient pest control.

Additionally, the lack of a robust network of agricultural input suppliers and limited access to low-cost pesticides pose significant challenges to the spread of modern pest control practices. This scenario provides an opportunity to promote the responsible use of pesticides and encourage sustainable approaches, such as biological control, the use of natural compounds, and Integrated Pest Management (IPM).

On the other hand, the combination of traditional practices and modern methods can represent a viable solution for small and medium-sized producers. The adoption of good agricultural practices, combined with the strengthening of technical assistance and training in sustainable methods, will be crucial to avoid the negative impacts of the excessive use of agrochemicals and, at the same time, increase the resilience of crops to emerging pests.

3.3.2 Agricultural Potential and Traditional Knowledge

Angola's agricultural potential is impressive, especially in the Central Plateau region, which includes the provinces of Huambo, Bié, Malange and Huila. These areas benefit from favorable agro-climatic conditions, such as fertile soils and a favorable climate, which are ideal for growing essential crops such as cassava, corn, beans, potatoes, and vegetables. With a dense population and a predominance of smallholder farmers, this region plays a vital role in the country's food security and rural development.

However, the full use of this agricultural potential faces significant challenges. Smallholders, who make up the majority of farmers, have limited access to advanced technologies and modern farming practices, which limits productivity and sustainable management of natural resources. This limitation is reflected in the difficulty of adopting practices that could maximize agricultural yields and promote sustainability.

Traditional knowledge has been a key piece in pest management in Angola. Methods such as the use of repellent plants, intercropping, and crop rotation not only help control pests naturally, but also improve soil fertility. These methods are cost-effective and environmentally safe, offering a valuable alternative to using chemicals. However, the gradual abandonment of these practices, motivated by the lack of incentive and integration with modern techniques, threatens the preservation of this vital knowledge.

However, the Agricultural Field Schools (ECA) approach presents a promising solution (capacity building of smallholder farmers, combining traditional knowledge with modern technologies, and offers hands-on training in integrated pest management, good agricultural practices, and sustainable use of inputs) to revitalize these practices.

Improper use of both traditional and modern pest management methods can result in significant risks to the health and safety of farmers and local communities. The use of chemical pesticides, often adopted for pest control, is associated with risks of poisoning, respiratory problems, skin diseases and chronic effects such as cancer. In addition, the indiscriminate use of these products leads to serious environmental impacts, including soil and water contamination, harming biodiversity and ecological balance.

To mitigate these risks, it is essential to adopt an Integrated Pest Management (IPM) that combines biological, cultural, and physical methods with the rational use of chemicals as a last resort. The following measures are recommended:

- Regular training in good agricultural practices, safe pesticide use, and proper handling of PPE should be provided to farmers.
- Encouraging the use of natural predators, repellent plants and intercropping can reduce dependence on chemical pesticides, preserving biodiversity and ecological balance.
- Establish monitoring systems to track pesticide use and assess their environmental and health impacts. Local authorities and plant health services should work together to ensure compliance with regulations.
- Implement protocols for the safe storage and proper disposal of pesticides and their packaging, to avoid soil and water contamination.

Thus, the combination of traditional knowledge and technological solutions can unlock Angola's agricultural potential, ensuring greater productivity, sustainability, and food security. Continuous investments in training, research, and valuing local knowledge are essential to strengthen smallholders and drive a more resilient and competitive agricultural sector.

3.3.3 Recommendations and Approaches

To strengthen pest management and support farmers in the context of the project, it is essential to adopt integrated strategies that combine traditional practices and modern solutions. Key recommendations[3] include:

- **Promotion of Integrated Pest Management (IPM)**

Implement a comprehensive IPM program, prioritizing the use of sustainable methods such as biological control, cultural practices (crop rotation, intercropping), and the use of repellent plants. The use of chemical pesticides should be restricted as a last option, being applied selectively and responsibly to minimize environmental impacts and health risks.

- **Valuing and Encouraging Traditional Knowledge**

Recognize, document, and disseminate effective traditional practices, such as the use of natural plant extracts and physical methods for pest control. Training programs should integrate these methods with modern technologies, ensuring that local knowledge is valued and preserved.

- **Continuous Empowerment of Farmers**

[3] The main recommendations can be seen in table 3, below.

Expand Agricultural Field Schools (ECA) to provide hands-on, participatory trainings on pest identification, safe and correct pesticide use, integrated management techniques, and good agricultural practices. Farmer leaders must be empowered to act as multipliers within their communities.

- **Access to Sustainable Inputs**

Facilitate access to safer and more affordable alternatives, such as biopesticides and products of natural origin, promoting the gradual replacement of highly toxic agrochemicals. Encouraging local production of natural inputs can reduce costs and stimulate the local economy.

- **Institutional and Public Policy Strengthening**

Strengthen the capacities of government institutions responsible for monitoring and enforcing pesticide use. Develop specific public policies that encourage sustainable agricultural practices and ensure compliance with national and international environmental and phytosanitary safety regulations.

- **Constant Monitoring and Evaluation**

Establish a system for continuous monitoring of pests and management practices adopted, with clear indicators to measure the effectiveness of the actions implemented. Regular reports should be prepared, allowing for adjustments to strategies as needed.

- **Strategic Partnerships**

To stimulate collaborations between researchers, educational institutions, NGOs and international organizations to develop innovative solutions, validate pest control methods and strengthen knowledge transfer.

- **Sensitization and Awareness**

Conduct educational campaigns to raise awareness among farmers and communities about the risks associated with inappropriate pesticide use and the benefits of integrated and sustainable approaches. Communication must be simple, practical and adapted to the local reality.

By adopting these approaches, the project can contribute to more effective, sustainable, and environmentally safe pest management, promoting agricultural productivity and food security in Angola. The integration of traditional practices with modern technologies, combined with investments in training and monitoring, is essential to build a resilient and competitive agricultural sector.

Table 3: Key recommendations on agrochemical management

ITEM	COMPONENTS	SYSTEMS AND PROCEDURES
1	Fertiliser	The use of animal and plant manure (compost) is strongly encouraged as one of the ways to add organic matter to the soil to provide nutrients such as nitrogen (N), phosphorus (P) and potassium (K), but in small amounts. These have been adopted mainly by small farmers who produce for the open market and self-consumption.
2	Pesticide	It starts by encouraging the preparation and use of homemade pesticides to reduce costs and, at the same time, carry out the effective treatment of some pests. The most important and recommended pesticides of this nature include: (i) petroleum emulsion, which is a contact insecticide that is useful against many sucking insects; (ii) tobacco mixture, very effective in controlling microorganisms that infest vegetable crops; (iii) Margosa (Azadirachta indica) seed emulsion (neem) very effective as a locust repellent. These were adopted at random by all classes of producers and especially by small producers who produce for open markets and self-consumption. In addition, the project has had its own lists of fungicides, insecticides and herbicides recommended for use in the different plantations, mainly horticulture and fruits.

4. CURRENT ISSUES ON THE USE AND MANAGEMENT OF CHEMICAL PESTICIDES IN THE COUNTRY

4.1 PESTICIDE USE IN THE COUNTRY (QUANTITIES, TYPES, APPROVAL, CONTROL, ETC.)

Pesticide management in Angola has become a topic of increasing relevance, especially in view of the challenges faced by the agricultural sector in controlling pests, diseases and weeds. With the increase in demand for productivity and the expansion of cultivated areas, the use of pesticides has become a recurrent practice, especially in monocultures such as corn, beans, fruits and vegetables. However, the lack of a robust regulation and monitoring system raises significant concerns about food safety, public health, and environmental preservation.

There are basic regulations for the import, distribution and use of pesticides, under the responsibility of the Ministry of Agriculture and Forestry (MINAGRIF) and with complementary supervision by the

Ministry of the Environment. However, the implementation of these standards is limited by structural weaknesses, lack of effective oversight and lack of trained human resources. The absence of a consolidated national monitoring system prevents the collection of accurate data on quantities consumed, types of pesticides used, and their environmental and social impacts.

In regions of intensive cultivation, such as the Central Plateau and other prominent agricultural areas, the use of pesticides has increased significantly, following the intensification of agricultural production. However, inappropriate practices are common, such as the use of obsolete or expired products, application without technical guidance, and incorrect disposal of packaging, which is often reused for domestic purposes, contaminating soil and water resources.

Phytosanitary services play a central role in the supervision, inspection and technical guidance on the use of pesticides. However, they face limitations such as poor infrastructure, scarcity of financial resources, and a lack of comprehensive training programs for extension workers and farmers. Inter-institutional coordination between MINAGRIF and the Ministry of the Environment is also insufficient, which compromises the effective implementation of environmental management and protection policies.

Despite the challenges, one-off initiatives funded by international partners have sought to promote sustainable practices, including Integrated Pest Management (IPM). This approach prioritizes reducing the use of chemicals through alternative methods such as biological control, cultural practices (crop rotation and intercropping), and the use of natural compounds. However, these initiatives still have limited scope and need to be scaled up to bring about structural and lasting change.

Overall, the current stage of pesticide management in Angola can be considered incipient. Coordinated efforts are needed to strengthen regulation, improve enforcement, empower farmers, and encourage sustainable alternatives to chemical use. Investments in research, technological innovation, and agricultural education will be essential to ensure that pesticide management contributes to safer, more productive, and environmentally sustainable agriculture in the country.

4.1.1 Types of Pesticides Used in Angola

In Angola, pesticides play a key role in controlling pests, diseases, and weeds, especially in essential crops such as maize, beans, vegetables, fruits, and cassava. The choice and type of pesticides used vary

according to the profile of farmers, the scale of production, the crops grown and access to agricultural inputs[4].

Table 4: Most common pesticides

#	NAME	PRODUCT	DESCRIPTION
1	Insecticides are widely used in Angola to control insects that affect crops such as corn, beans and vegetables.	**Cypermethrin**	A broad-spectrum pyrethroid insecticide, often used to control pests such as caterpillars, aphids, and whiteflies. It is popular for its efficiency and relatively affordable cost.
		Lambda-cyhalothrin	a pyrethroid, used in crops such as corn and vegetables to combat foliar pests.
		Chlorpyrifos	An organophosphate used on a smaller scale due to toxicity restrictions and concerns.
2	Fungicides are applied to prevent and treat fungal diseases that affect crops, especially vegetables, fruits, and cereals.	**Mancozeb**	A contact fungicide widely used in vegetables, such as tomatoes, to control fungal diseases, such as downy mildew and rust.
		Cobox (Copper Sulfate):	Applied to fruits and vegetables for the control of diseases such as late blight and leaf spots.
		Carbendazim	Mainly used in cereal and fruit crops to control anthracnose and other storage diseases.
3	Herbicides are employed to control weeds that compete with crops for water, nutrients, and sunlight.	**Glyphosate**	The most widely used herbicide, mainly applied in pre-planting areas to eradicate weeds. It is popular among large agricultural operators.
		Teodan	Used in cereal crops for the control of resistant weeds.
		Atrazine	Applied to corn and cassava crops to control grasses and broadleaf weeds.

[4] The most common pesticides used in the country can be classified into four main categories

#	NAME	PRODUCT	DESCRIPTION
4	Rodenticides are less widely used, but they play a crucial role in controlling rodent pests that affect food and seed stocks.	**Bromadiolone**	An anticoagulant used to control rats and mice in grain depots.
		Zinc phosphide	Used in agricultural areas to control rodent populations in the field.

The choice of the type of pesticides used is essential to ensure the sustainability of agricultural production, food safety and environmental protection. Opting for appropriate, effective, and safe pesticides minimizes risks to human health, reduces negative impacts on the environment, and prevents the development of resistance by pests. The careful selection of pesticides, especially those that are less toxic and rapidly decomposing in the environment, contributes to the preservation of biodiversity and the maintenance of soil fertility.

Additionally, the proper choice of pesticides ensures compliance with national and international regulations, avoiding legal and commercial issues. This approach also promotes the use of sustainable alternatives, such as biopesticides and biological control methods, which not only protect local ecosystems but also strengthen agricultural practices that are more resilient and adaptable to climate change.

In summary, informed and judicious pesticide selection is an essential element for sustainable agriculture, balancing productivity with environmental conservation and the health of farming communities.

4.1.2 Types of Pesticides Prohibited for Sale in Angola

In Angola, the use of pesticides is regulated to protect human health and the environment. Pesticides are chemicals used in agriculture to control pests that can damage crops, but many of them have toxic effects that can be harmful not only to pests but also to humans, animals, and the ecosystem. Therefore, there is a list of pesticides whose sale and commercialization are prohibited in the country, based on their high toxicity and the risks associated with their use. The list of pesticides banned in Angola includes substances such as:

- Aldrin
- Dieldrin
- DDT
- Captafol

- Chlordane
- Chlordimeform
- Chlorobenzylate
- EDB (1,2, dibromoetane)
- Dieldrin
- Dinoseb
- HEH (stereo isomer set)
- Heptachlor
- Hexachlorhebenzene
- Lindane
- Pentachlorophenol.

These pesticides are classified in toxicity groups I and II, which are considered highly hazardous due to their harmful effects. The ban on these pesticides follows international guidelines that seek to limit the use of hazardous chemicals in agriculture and protect local communities from exposure to substances that can cause health problems, such as cancer, reproductive problems, and neurological disorders.

Additionally, the ban reflects Angola's commitments to international conventions, such as the Stockholm Convention on Persistent Organic Pollutants (POPs), which aims to eliminate or restrict the production and use of POPs worldwide. These regulatory measures are essential to ensure food safety and promote sustainable agricultural practices while minimizing environmental impact and preserving biodiversity.

4.1.3 Control and Monitoring of Pesticide Management in Angola

The control of pesticide management in Angola is carried out by different government and institutional entities, each with specific responsibilities that complement each other. The main challenge lies in coordinating between these entities to ensure efficient and comprehensive supervision. The Pesticide Control Entities:

- **Ministry of Agriculture and Forestry (MINAGRIF)**

The Ministry of Agriculture and Forestry (MINAGRIF) is the main entity responsible for the regulation, supervision and implementation of agriculture-related policies, with emphasis on the management and use of pesticides. Among its attributions are the approval of the import, registration and commercialization of these products in the country, ensuring that they meet quality and safety standards. In addition, MINAGRIF coordinates training programs aimed at farmers and technicians, promoting good practices in pesticide management and application. It also oversees the Provincial

Directorates of Agriculture, which play a crucial role in monitoring and controlling the local use of pesticides, ensuring their responsible application and in compliance with current regulations.

- **Plant Health Services (Phytosanitary Services)**

Phytosanitary services at MINAGRIF are exercised by the National Directorate of Agriculture and Livestock (DNAP), which exercises licensing for the import of pesticides. In addition, the IIA, INCA, IDF, ISV, carry out specific tests of their products and the IDA promotes them to family farmers. These services have the following main functions:

- Monitor plant pests and diseases that require the use of pesticides.
- To monitor the use of pesticides by farmers and operators, ensuring compliance with standards.
- Conduct inspections of agricultural fields, pesticide storage and marketing sites.
- Promote awareness about the safe use of pesticides and their relationship with plant health.

The regulation for the management of pesticides used in agriculture and veterinary medicine, by private or official entities, is subject to the prior participation of the local health authority. Entities that use conditional pesticides are responsible for their controlled application, according to their instructions, in order to avoid accidents, both in the team that performs the use and in the consumers of the foodstuffs treated with them.

On the other hand, phytosanitary services ensure that pesticides are used as part of an integrated strategy for pest management, preventing their indiscriminate use and promoting sustainable alternatives.

- **Ministry of the Environment:**

The Ministry of the Environment is responsible for monitoring the environmental impacts associated with the use of pesticides, ensuring that agricultural practices do not compromise the health of soil, water and ecosystems. In addition, it promotes initiatives aimed at reducing environmental pollution resulting from the inappropriate use of chemicals, encouraging more sustainable practices. The Ministry also coordinates actions with the Ministry of Agriculture and Forestry (MINAGRIF) to ensure that the use of pesticides is in line with environmental protection guidelines, strengthening the integration between productive agriculture and sustainability.

- **Customs Agencies and Customs Authorities**

Customs Agencies and Customs Authorities play a key role in overseeing the import of pesticides, ensuring that only registered and authorized products are introduced into the country. These entities work closely with the Ministry of Agriculture and Forestry (MINAGRIF) to prevent smuggling and the

entry of unauthorized or counterfeit pesticides, contributing to regulation and safety in the use of these products.

- **Agricultural Research Institutions**

Agricultural Research Institutions play an essential role in developing and evaluating alternatives to chemical pesticides, such as biopesticides and biological control methods, promoting more sustainable and environmentally safe agricultural practices. In addition, these institutions provide technical support to phytosanitary services, assisting in the implementation of integrated pest management (IPM) through strategies based on research and innovation, strengthening the effectiveness of actions in the field and contributing to agricultural sustainability in Angola.

In summary, pesticide management and use in Angola still face significant challenges related to regulation, enforcement, and enforcement practices. While there have been advances in access to and use of pesticides to increase agricultural productivity, the absence of a robust national system for monitoring and control results in poor practices, such as the use of unauthorized or expired products and the incorrect disposal of packaging. Despite this, pesticides such as insecticides, fungicides, and herbicides continue to be widely used, with a higher concentration in crops such as corn, beans, and vegetables. To move forward, it is essential to strengthen regulation, train farmers, promote sustainable alternatives, and implement more effective enforcement systems, balancing agricultural productivity and environmental protection.

4.2 CIRCUMSTANCES OF PESTICIDE USE AND COMPETENCE TO HANDLE THE PRODUCTS

The use of pesticides in Angola is deeply associated with the country's agricultural context, where family and subsistence farming plays an essential role in food security and the local economy. Reliance on chemical pesticides reflects the urgent need to protect crops against pests and diseases, but at the same time, it reveals the lack of effective and affordable alternatives for farmers. This scenario is exacerbated by socioeconomic, institutional and environmental challenges, which influence both the circumstances of use and the technical competence of users to handle these products.

Historically, Angola has faced difficulties in rebuilding the agricultural sector after decades of conflict, which included the effort to revitalize agricultural practices and the need to ensure food production. However, the absence of adequate infrastructure, robust policies, and technical assistance has limited the implementation of more modern and sustainable agricultural technologies. In this context, pesticides emerge as an immediate and widely accessible solution, although their inappropriate use poses significant risks to human health, the environment, and economic productivity.

Most of the pesticides used in the country are imported and often circulate through formal and informal distribution channels. The informal market, marked by the supply of unregistered or illegal products, is widely sought after by farmers due to its availability and lower cost. The lack of strict regulation and efficient enforcement exacerbates this scenario, allowing non-certified products to be widely used.

In addition, the low level of education and the absence of regular technical training programs among farmers contribute to the unsafe and ineffective application of these products. Lack of access to Personal Protective Equipment (PPE) puts farmers at direct risk of acute and chronic poisoning, compromising the health of farming communities. Similarly, the lack of adequate infrastructure for the safe storage and disposal of pesticides and their packaging leads to contamination of soil, water resources, and prolonged environmental exposure.

The project should prioritize mitigation measures that minimize the uncontrolled use of pesticides, promoting their use only when strictly necessary and in an integrated manner with an Integrated Pest Management (IPM) approach. This includes developing clear guidelines for the strategic and safe use of pesticides, promoting alternative agricultural practices such as biological control and cultural methods, and building the capacity of farmers in good agricultural practices and safe handling.

Additionally, implementing technical training programs aimed at farmers and extension workers is essential to ensure that pesticide use occurs responsibly and safely. Such programmes should include modules on:

- Identification of pests and diseases.
- Correct and safe use of pesticides (including dosage and application methods).
- Proper storage and disposal of pesticides and packaging.
- Importance of using PPE and safety measures during application.

Inspection and regulation also need to be strengthened, with coordinated action between the Ministry of Agriculture and Forestry (MINAGRIF), the phytosanitary services and the Ministry of the Environment, aiming to control the import, commercialization and use of chemical products. The implementation of a national monitoring system will make it possible to identify patterns of use, emerging risks and most vulnerable regions, ensuring an adequate and effective response.

In his view, inadequate management of pesticide use in Angola reflects a systemic challenge that requires coordinated efforts between government, international organizations, and civil society[5]. Only

[5] Life of the Indicative Action Plan with respective application competence, in table 4

with investments in regulation, inspection, technical training, and promotion of sustainable agricultural practices will it be possible to mitigate negative impacts and ensure safer agriculture in line with the principles of environmental sustainability.

Table 5: Indicative Action Plan

ACTIVITY	SHAREHOLDERS	OBJECTIVE
Mobilization	• MINAMB • MINES • Private sector, NGOs, small, medium and large farmers in the project area.	• Establishment of the Central Management Team of the PMP (Representatives of the identified sectors and subsectors of reference. • A national workshop in the project area to identify agencies and individuals who will lead the formulation and implementation of the project PMP.
Diagnosis	• MINAMB • MINES • Private sector, NGOs, small, medium and large farmers in the project area.	• Take stock of the main issues affecting the subsector in the country and in the project area. • Extensive use of lessons learned in ongoing projects. • Concise definition of the baseline. • Agree on the sequence of Activities to formulate an action plan and its contents.
Formulation of specific action plans	• MINAMB • MINES • Private sector, NGOs, small, medium and large farmers in the project area.	• Identification of specific issues and activities (including corrective actions observed in the experiences of previous and ongoing projects) to be carried out on IPM, pesticide regulation, research and others.
Implementation of the action plans	• MINAMB • MINES • Private sector, NGOs, small, medium and large farmers in the project area.	• Separate and coordinated actions on GIP, pesticide regulation, research, and others.
Monitoring and evaluation and lessons learned to feed into the project and the	• MINAMB • MINES • Private sector, NGOs, small, medium and large farmers in the project area.	• Continuous monitoring, introduction of corrective measures when necessary, extraction of lessons learned and feedback for the project and GIP in general.

ACTIVITY	SHAREHOLDERS	OBJECTIVE
relevant sub-sectors in general.		

4.3 ASSESSMENT OF RISKS TO THE ENVIRONMENT, TO THE HEALTH OF THE POPULATION AND TO THE ECONOMY

4.3.1 Pest Management Background and Experience

Pest management in Angola has evolved from a combination of traditional and modern practices, shaped by the challenges and growing needs of the country's agricultural sector. Historically, Angolan farmers have used traditional pest control methods, such as the use of ash, repellent plants, crop rotation, and manual pest removal. These practices, passed down from generation to generation, were affordable and effective for small growing areas, ensuring the protection of crops in a sustainable way.

With population growth and the urgent need to increase agricultural production, especially in the post-war period, there was a transition to methods based on the use of chemical pesticides due to their immediate effectiveness in combating pests. However, this growing dependence occurred in a context marked by the lack of adequate regulation, inspection and technical guidance. As a result, poor practices have spread, aggravating environmental and public health risks and compromising the sustainability of the agricultural sector.

Currently, pest management in Angola faces several challenges, the predominance of the use of chemical pesticides, especially in commercial and subsistence agricultural areas, remains a worrying reality. Many of these products are of poor quality, illegal, or purchased in informal markets, exacerbating the risks of soil, water, and food contamination. In addition, the lack of technical training among farmers and the absence of safe handling, storage, and application practices increase the exposure of workers and rural communities to the toxic effects of pesticides.

Another factor that intensifies the challenges of pest management in Angola is the impact of climate change, which has contributed to the proliferation and geographic expansion of pests. Invasive pests, such as fall armyworm (Spodoptera frugiperda) and palm bug bug, have become a significant threat, causing great damage to major crops such as corn, beans, and cassava. Pest resistance to chemical pesticides, resulting from the excessive and inappropriate use of these products, has also become a growing concern, requiring more effective and sustainable alternatives.

Despite the difficulties, some initiatives have promoted important advances in pest management in the country. International partnerships, such as those promoted by FAO (Food and Agriculture Organization of the United Nations), have played a central role in the introduction of biological control practices, the use of natural extracts and the training of farmers in Integrated Pest Management (IPM). Pilot projects have demonstrated the potential of using natural enemies, such as predators and parasites, for sustainable pest control, offering a viable alternative to the use of chemical pesticides.

Additionally, education and training efforts have been implemented, encouraging safer farming practices and increasing farmers' awareness of the risks and impacts of inappropriate pesticide use. Capacity building programmes, carried out in collaboration with agricultural field schools (ECAs) and technical partners, have helped to spread knowledge about integrated control methods and sustainable management techniques.

Risks associated with inappropriate pesticide use include problems with storage, transportation, and dosing during treatments. Contamination of applicators and surrounding communities, especially when safe use instructions are not followed, represents one of the main impacts. Exposure to treated areas, such as pastures, without proper preventive control and adequate communication, further increases the risks to human and animal health.

While significant progress is being made, much still needs to be accomplished to ensure that pest management in Angola is truly sustainable. The country's practical experience shows that excessive dependence on chemical pesticides generates cumulative negative impacts on the environment, public health and the agricultural economy. The strengthening of public policies and regulations, combined with the integration of traditional practices, biological control and modern methods, will be essential to address these challenges effectively.

Priority investments should be made in technical infrastructure, continuous training of farmers and strengthening of inspection activities. The implementation of an Integrated Pest Management (IPM), which combines cultural, biological, and chemical methods in a responsible manner, is key to ensuring food security, environmental protection, and sustainable agricultural development in Angola. Joining efforts between government, research institutions, farmers and international partners will be key to transforming pest management into a model of sustainability and resilience.

4.3.2 Risks to the Environment

The environmental impact of inadequate pest management and pesticide use in Angola is profound and multifaceted, affecting many components of ecosystems. Soil contamination is one of the most visible consequences, resulting in the accumulation of chemical residues that compromise fertility and

alter the microbiota essential for soil health. This degradation affects not only agricultural productivity, but also the soil's ability to sustain biodiversity.

Pollution of water resources is another critical impact, as pesticide runoff during rainfall or irrigation practices leads to the contamination of rivers, lakes, and groundwater, threatening both aquatic life and human communities that depend on these sources for consumption and agriculture. In addition, the introduction of chemicals into water bodies can trigger eutrophication processes, which unbalance aquatic ecosystems by promoting excessive algae growth and reducing oxygen levels.

Biodiversity suffers direct and indirect impacts from the use of pesticides. In the biodiversity component, non-target organisms, such as pollinators and natural pest predators, are often affected, resulting in a decrease in these populations. This loss not only threatens endemic and sensitive species, but also destabilizes the ecological balance, increasing the vulnerability of agricultural systems to new pests.

The air is also impacted, especially in areas where aerial spraying of pesticides is common practice. The dispersion of chemical particles can reach areas beyond the crop field, contaminating the air and endangering adjacent communities and ecosystems.

The persistence of pesticides in the environment is an additional concern, as many chemical compounds used are highly stable and remain active for long periods. They accumulate in food chains, affecting species at the top, such as birds and mammals, and can also contaminate food consumed by humans.

These environmental impacts have cascading effects, compromising the health of ecosystems and reducing environmental resilience. In Angola, these problems are exacerbated by the improper disposal of contaminated packaging and obsolete pesticides, which increase the toxic load in the environment, and by the lack of infrastructure and effective regulation to mitigate these effects. Thus, pest management and pesticide use, if not conducted sustainably, pose a growing threat to the environmental integrity of the country.

4.3.3 Risks to the Health of the Population

The risks to population health associated with pest management and pesticide use in Angola are significant and encompass both agricultural workers and communities near the cultivation areas. Inadequate exposure is mainly due to direct handling of pesticides without the use of personal protective equipment (PPE), a common practice among farmers, who often lack access to training or technical information on safety. This exposure can lead to acute poisoning, characterized by symptoms

such as dizziness, nausea, vomiting, skin irritation, and respiratory problems. In more severe cases, direct exposure can result in hospitalizations or even deaths.

In addition, chronic exposure, resulting from prolonged contact with pesticide residues in the environment, is associated with serious diseases, such as cancer, endocrine dysfunctions, neurological problems and respiratory complications. Studies in farming communities show that workers and nearby residents have higher rates of these conditions, compared to unexposed populations.

Another important risk is food contamination, which is associated with improper application of pesticides on plants, especially close to the harvest period, which can leave toxic residues in the products consumed by the population. This factor not only compromises food safety but also poses a direct risk to the health of consumers. Cases of food poisoning, associated with the consumption of contaminated vegetables and fruits, are frequently reported.

Water is also a vector of contamination, as the excessive use of pesticides, combined with poor application and disposal practices, leads to the contamination of water sources. This directly affects the health of communities that depend on these sources for domestic and agricultural consumption, exposing them to toxic substances present in pesticides.

Improper disposal of pesticide packaging further increases public health risks. In some rural areas, contaminated packaging is reused for water or food storage, exposing the population to hazardous chemical waste. Children, in particular, are vulnerable, as they can come into inadvertent contact with these packages, resulting in serious poisoning.

Inadequate pesticide management and a lack of effective regulation in Angola exacerbate these risks. The absence of inspection and technical training programs for farmers and agricultural workers creates an environment of vulnerability, where the health of the population is often compromised due to the search for agricultural productivity. An integrated approach that includes training, strict regulation, and access to sustainable alternatives is essential to mitigate these impacts and protect the health of communities across the country.

4.3.4 Risks to the Economy

The risks to the economy associated with pest management and pesticide use in Angola are diverse and impact both farmers and the agricultural sector as a whole. One of the main economic challenges is related to pest resistance to pesticides due to the inappropriate and frequent use of the same chemicals. This requires the application of larger quantities or the acquisition of more expensive pesticides, increasing production costs for farmers, especially small-scale ones, who make up the

majority in Angola. This increase in costs is often not accompanied by a commensurate increase in productivity, resulting in narrower profit margins.

In addition, environmental contamination from pesticide use has long-term economic consequences, particularly in soil degradation and pollution of water resources. The loss of soil fertility due to the accumulation of chemical residues harms agricultural productivity and requires investments in environmental recovery or in corrective techniques, such as the use of additional fertilizers, further increasing production costs. Similarly, pollution from water sources can generate extra expenses for treatment, affecting both agriculture and other sectors that depend on these resources.

Another significant risk is related to the rejection of Angolan agricultural products in international markets, due to the level of concentration of pesticide residues, thus representing a trade barrier, affecting the competitiveness and credibility of the country's products. This not only reduces export revenues but can also lead to the loss of strategic markets, negatively impacting the trade balance and the local economy.

At the level of rural communities, economic impacts are compounded by the loss of workforce due to diseases related to pesticide exposure. Poisoned farmers often have to temporarily or permanently abandon their activities, which reduces agricultural production and household income. In addition, the health costs associated with treating acute poisonings or chronic diseases generated by the inappropriate use of pesticides overwhelm families and local health systems, diverting resources that could be invested in other economic needs.

The lack of effective regulation and control over the use and distribution of pesticides also affects the economy. The entry and marketing of illegal or low-quality pesticides by the informal market not only compromises the effectiveness of pest control, but also generates financial losses for farmers who invest in products that do not deliver the expected results. In addition, obsolete pesticide stocks, often stored in inadequate conditions, represent an economic liability, as they require significant investments for the safe disposal or remediation of contaminated areas.

Finally, the economic impacts are amplified by the lack of incentives to adopt more sustainable agricultural practices, such as the Integrated Pest Management (IPM). This gap perpetuates reliance on harmful practices and limits the transition to more efficient and environmentally responsible production systems. To mitigate these risks, it is essential to invest in technical training, strict regulation, access to sustainable alternatives, and the necessary infrastructure for the proper management of pesticides and agricultural residues. In this way, it will be possible to protect the country's agricultural economy and promote sustainable development in the sector.

Overall, the risks associated with pesticide use in Angola are broad and encompass environmental, public health, and economic issues. Implementing an integrated approach, with effective regulation, technical capacity building, and investments in sustainable solutions, is essential to mitigate these impacts and promote a safer and more productive future for the Angolan agricultural sector.

4.3.5 Summary Matrix of Environmental, Population Health and Economic Risks and Impacts

Table 6 provides an overview of environmental, population health and economic risks and impacts, as well as their mitigation measures and monitoring indicators.

Table 6: Environmental, population health and economic risks and impacts, as well as their mitigation measures and monitoring indicators

RISKS AND IMPACTS OF PESTICIDE USE	CAUSES	MITIGATION MEASURES	EXPECTED RESULTS	MONITORING INDICATORS
Pollution of water resources	Improper handling, transport, application and disposal of pesticide containers	Control and supervision Pesticide use by farmers.	Farmers trained in IPM techniques.	• No Trained Farmers. • Register of trained farmers.
		Disposal of pesticide containers by dealers and farmers.	Container Management Plan developed and implemented.	• No of farmers/dealers aware of the process of the containers used.
		Monitor the use of pesticides in water resources and their impact on flora and fauna.	Concentration of pesticides in water resources.	• Pesticide levels in water resources.
Soil pollution		• Provide adequate storage storage. • Use biological beds, drainage channels and drainage dams for the treatment of pesticide residues. • Use chemical scraps to respray crops. • Stock up regularly on pesticides for early screening for leaks and residues.	Implementation of the Pest and Pesticide Management Plan.	• Pulverized Areas No. • Total waste treated.
Poisoning of fauna, flora and humans by improper use of	Personnel, not trained in pesticide application techniques,	Educate farmers and their agricultural assistants about the	Proper use of pesticides by farmers and extension workers.	• No cases of pesticide poisoning occurring under the project.

RISKS AND IMPACTS OF PESTICIDE USE	CAUSES	MITIGATION MEASURES	EXPECTED RESULTS	MONITORING INDICATORS
pesticides by farmers and their assistants.	inappropriate use of EPP.	proper use of pesticides and dangers of pesticide use.		
		Control and supervision	Farmers trained in IPM techniques.	• In the case of trained farmers, records of training carried out.
		Use of pesticides on agricultural properties.	Pesticide residue on acceptable crops.	• Levels and trends of pesticide residues in sampled crops.
		Educate farmers, agricultural auxiliaries, and local communities about health risks associated with the use of pesticide containers already in use.	Farmers and auxiliaries, local communities educated about the health risks of pesticide poisoning, mainly using used containers.	• No cases of pesticide poisoning through the use of pesticide containers; • No farmers who register empty pesticide containers at collection points; • In the case of farmers, dealers trained in the proper cleaning of pesticide containers.
Poisoning of flora, fauna and humans by improper disposal of containers.	Improper disposal of pesticide containers and obsolete pesticides after use,	• Eliminate/destroy pesticide containers after use; • Promote the use of non-persistent pesticides and known target species.	Pesticide container cleaning and disposal plan developed and implemented.	
Poor management of obsolete pesticides and disposal of chemical residues.	Indiscriminate disposal of obsolete pesticides	Purchase only the necessary amounts of pesticides to avoid the accumulation of unused pesticides.		

RISKS AND IMPACTS OF PESTICIDE USE	CAUSES	MITIGATION MEASURES	EXPECTED RESULTS	MONITORING INDICATORS
	Lack of capacity to manage pesticide residues	Improve the capacity of local waste management authorities to deal with obsolete pesticides and chemical waste management.		
Threat of other pests and diseases.	Incorrect selection and use of pesticides.	Education and training	Farmers trained in GIP and BPA techniques.	• In the number of trained farmers, training records • Level of Incidence of Pests at Harvest Time • Level of production losses due to pests.
		Farmers adopt good agricultural practices (GAP).		
		Apply EPA pesticide approval if necessary.	Pesticides applied, registered and approved by key stakeholders and in accordance with IPM principles.	• Pesticide records applied on each farm.
Impact of post-harvest losses due to pests	Incorrect storage	Provide adequate storage facilities.	Post-harvest losses Avoided or minimised with pesticide application registered and approved by key stakeholders and in accordance with IPM.	• In the case of farmers trained in IPM techniques for post-harvest storage; • In and Status of Storage Facilities in Use in the Project
		Monitor the incidence of post-harvest pests.		• No cases of post-harvest pests

RISKS AND IMPACTS OF PESTICIDE USE	CAUSES	MITIGATION MEASURES	EXPECTED RESULTS	MONITORING INDICATORS
		Confirm the status and integrity/validity of stored pesticides before use.	Only approved dealers and suppliers of pesticides licensed under the project.	• Records of pesticides applied at storage sites.
				• Company registration documents • Evidence of license/permit to operate with pesticides. • Evidence of location and vendor/reseller contracts.
			Only pesticides registered under the project were approved	• List of pesticides supplied and used in accordance with Angola's law on the use of registered and approved pesticides.
Abuses in the supply and sale of pesticides.	Lack of institutional capacity to monitor the production, importation and sale of pesticides.	Confirm the status and integrity of the pesticides provided in the project.	Avoid the use of false and out-of-date pesticides prohibited pesticides avoided Pesticide integrity Guaranteed at the farm level.	• Cases of pesticides found in non-original containers.
				• Pesticide inspection records at the farm gate prior to use.
		Ban large containers of pesticides to minimize cases of decantation (use of containers other than the originals for sale in smaller quantities).	All pesticides delivered for use remain in original containers.	• Cases of pesticides found in non-original containers.

RISKS AND IMPACTS OF PESTICIDE USE	CAUSES	MITIGATION MEASURES	EXPECTED RESULTS	MONITORING INDICATORS
Farmer/crop health and safety and environmental hazards/damage	Need for training	Educate farmers to adopt BAP based on IPM techniques; and do not use chemical pesticides unless recommended by authorized technicians.	Compliance with country legal regulations and BAD Policy on pests/pesticide management.	• In the case of farmers trained in IPM techniques; • No farmers who implement IPM on their farms.
		Provide EPP to farmers/Farm Assistants for use during pesticide application in the field.	Farmers and their dependents (children) protected from pesticide exposure in the field.	• Quantities and types of PPEs supplied or made available under the project
		Train farmers and agricultural assistants/extension workers in the correct use of pesticides.	Farmers know the dangers of pesticide use for health and use information leaflets produced on the care and correct use of pesticides.	• In the case of farmers trained in appropriate pesticide handling; Number of farmers with copies of leaflets and guides on the risk/danger of improper pesticide use and pesticide care.
	Lack of training on pesticide use and handling	Properly dispose of obsolete and unused pesticides.	Obsolete and unused pesticide disposal plan prepared and implemented.	• Relationship between the supply and use of pesticides.
		Educate farmers to obtain or purchase required pesticide quantities at a given time to avoid long-term storage of pesticides.	Purchase only necessary pesticides and avoid storing pesticides for too long.	• Relationship between the supply and use of pesticides.

RISKS AND IMPACTS OF PESTICIDE USE	CAUSES	MITIGATION MEASURES	EXPECTED RESULTS	MONITORING INDICATORS
		Provide emergency response due to accidents and poisoning caused by pesticide use.	Management and/or control of accidents and emergencies due to pesticides within the project.	• Number of accidents and emergency cases caused by pesticides.
Child Labor Abuse	Poverty, cheap labor.	• Comply with national labor legislation that establishes a minimum working age; • Commit to ILO Conventions and the United Nations Convention on the Rights of the Child (1989).	No child labor	• Workers with minimum age allowed.
Depletion of Soil Organic Nutrients	Frequent and continuous application of chemical pesticides in agricultural fields will reduce soil potential and deplete soil organic nutrients needed for good crop yields, due to chemical imbalance. This would negatively affect crop growth and productivity in the long run.	• Apply soil conditioning measures that would also be part of the PMP. • Train farmers in the proper handling and application of chemical pesticides as recommended by the IPMP and the project.		• No of measures applied. • No of applied training.

RISKS AND IMPACTS OF PESTICIDE USE	CAUSES	MITIGATION MEASURES	EXPECTED RESULTS	MONITORING INDICATORS
Air Pollution and Contamination	The spillage of volatile pesticides can result in air pollution. Excessive application of pesticides through fumigation in crop fields and gardens would also result in air pollution. This will pose health risks to people and animals around the areas.	• Provide adequate storage to protect pesticides from wind currents. • Make a regular stock of pesticide packaging to detect losses and leaks in advance. • Apply Integrated Pesticide Management (reduction of chemical application). • Train employees and farmers to keep the spraying equipment in safe operating order and to use it correctly. • Provide protective clothing to workers and ensure that they are worn during the handling and application of pesticides to crops. • Train farmers in the proper handling and application of chemical pesticides and conduct routine medical examinations for workers. • Promote pest management to replace harmful chemicals.		• No of measures applied. • No of applied training. • Compliance Record No. of the cleaning plan. • Registration of conformity of the supply of PPE.

4.4 CONTROL OF THE DISTRIBUTION AND USE OF PESTICIDES

Controlling the distribution and use of pesticides in Angola presents significant challenges that directly affect public health, the environment, and the efficiency of agricultural production. The regulation and inspection of these products are under the responsibility of the National Directorate of Agriculture and Livestock (DNAP), the body in charge of registering pesticides, as well as the elaboration of standards and guidelines for their safe use. Despite this, there are limitations in the implementation and compliance with these regulations, reflected in inadequate practices of trade, application and disposal of pesticides, which generate negative impacts at different levels.

These challenges highlight the need to strengthen the pesticide management system in the country. This includes actions such as effective monitoring, training of farmers, development of infrastructure for proper disposal, and greater coordination between the responsible institutions. Table 7 below summarizes the main features of the pesticide management system in Angola and the recommended control measures to mitigate the problems identified.

Table 7: It summarizes the main features of the pesticide management system in Angola and the control measures

ITEM	AREA OF EXPERTISE	PROCEDURES AND MITIGATING MEASURES
1	General	• Pesticides used should be manufactured, formulated, packaged, labelled, handled, stored, disposed of and applied in accordance with the FAO International Code of Conduct on Pesticide Management; • Pesticides that fall within Hazard Classes 1a (extremely hazardous) and 1b (highly hazardous) of the WHO Recommended Classification of Pesticides or included in Annexes A and B of the Stockholm Convention should not be purchased, stored and used[6]. • Pesticides listed in WHO Hazard Class II[7] (moderately hazardous) should not be used unless the project has appropriate controls in place with respect to the manufacture, procurement or distribution and/or use of these chemicals. These chemicals should not be accessible to personnel without adequate training, equipment and

[6] The Stockholm Convention on Persistent Organic Pollutants 2011.

7 World Health Organization (WHO), Recommended Classification of Pesticides by Hazard and Guidelines to Classification, (Geneva, 2009) http://www.who.int/ipcs/publications/pesticides_hazard/en/.

ITEM	AREA OF EXPERTISE	PROCEDURES AND MITIGATING MEASURES
		facilities to handle, store, apply and dispose of these products correctly. • Selective pesticides with low environmental impact, rather than broad-spectrum products, should preferably be used to minimise impacts on non-target species. • Use resistant crops and varieties, crop sequences, associations, and cultural practices that minimize pressure and maximize biological prevention of pests and diseases. • Maintain a regular, quantitative assessment of the equilibrium state between pests and diseases and beneficial organisms of all crops. • Understand and use non-chemical pest and disease management practices. • Decide on interventions after consideration of all possible methods and their short- and long-term effects on agricultural productivity and environmental implications to minimize the use of agrochemicals and promote IPM. • Store and use agrochemicals in accordance with legal requirements, e.g. registration for individual crops, quantities, schedules and pre-harvest intervals. • Ensure that agrochemicals are applied only by people with specialized knowledge. • Ensure that the equipment used for the handling and application of agrochemicals complies with established safety and maintenance standards. • Maintain accurate records of agrochemical use. • Avoid any point source of agrochemical pollution resulting from the use, storage, cleaning and disposal of products or application equipment. • Avoid the impact on non-target areas of any pest and disease management activity.
2	Acquisitions	• Pesticides used should be manufactured, formulated, packaged, labelled, handled, stored, disposed of and applied in accordance with the FAO International Code of Conduct on Pesticide Management; • Pesticides that fall within Hazard Classes 1a (extremely hazardous) and 1b (highly hazardous) of the WHO Recommended Classification

ITEM	AREA OF EXPERTISE	PROCEDURES AND MITIGATING MEASURES
		of Pesticides or included in Annexes A and B of the Stockholm Convention should not be purchased, stored and used[8]. • The acquisition of pesticides is the exclusive prerogative of licensed and authorized agents. • According to Angolan law, the production, donation, marketing, importation and use of any pesticide substance is subject to prior registration: (i) registration is made on the basis of an application to be submitted by companies duly registered with the competent authorities, (ii) companies that register pesticides must also be registered with the competent authorities.
3	Storage	• Pesticides should not be stored: (i) in a manner that could result in contamination of animal feed or commercial fertilizers. (ii) on top of or against components of feed, foods of animal origin, food, medicines or children's toys. (iii) loaded into application equipment the area within a space of 92 meters. • For display purposes: (i) pesticides should not be placed on above shelves or against components of feed, animal feed, food, medicines, or children's toys. (ii) Racks or display areas used for pesticide display should be thoroughly cleaned before being reused for display of other products. • The pesticide store must be located away from watercourses, their banks and flood areas; as well as dwellings, food or feed storage areas and animal feeding sites. It should also be kept away from activities that present a fire hazard (e.g. welding activities) and be easily accessible to emergency vehicles. • The building must allow air renewal through openings at the top or bottom of the walls, avoiding being subject to high temperatures. • Have adequate drainage, and the water is collected and sent for appropriate treatment. • Have material for containment of spills (sand or sawdust, shovel, broom, garbage bin and plastic bags) and chemical powder extinguisher.

[8] The Stockholm Convention on Persistent Organic Pollutants 2011.

ITEM	AREA OF EXPERTISE	PROCEDURES AND MITIGATING MEASURES
4	Transportation of Pesticide Packaging in Bulk.	• Bulk pesticide packaging must comply with all applicable standards, • Bulk pesticide containers must be fully protected to prevent pesticide spillage and damage to the containers during transport. • Bulk pesticide containers must bear the label of the registered product for the material contained in them.
5	Bulk Pesticide Handling and Loading.	• Bulk pesticides must be handled, mixed and loaded in a way that ensures the protection of crops, livestock, the public and the environment. • Physical and chemical properties must be considered when handling and loading bulk pesticides. • Loading and mixing of bulk pesticides conducted at permanent distribution sites should be on impermeable surfaces with sufficient conditions to allow for the containment and recovery of any spill. • Prior to refilling, bulk pesticide containers should be thoroughly cleaned, except when a sealed or dedicated recyclable bulk container is refilled with the same labeled pesticide and has the same label as the immediately preceding pesticide.
6	Pesticide Application	• Always keep the products in the original, closed containers with labels. • The storage of pesticides should be carried out in a cool, dry and ventilated place, away from fire, food, feed, water and out of the reach of children. • The equipment must be in good working order and this must be ensured by regular testing and setting standards for application equipment. • Equipment for weighing and mixing pesticides should only be used for this purpose and should also be stored in the pesticide store. • The Personal Protective Equipment to be used by the farmer in spraying cannot be used for other purposes. • In the event of a spill, it must be absorbed immediately, by applying absorbent material (sand or sawdust) or sweeping the area. Waste resulting from the containment of spills must be disposed of in an environmentally safe manner (sending to landfill). • Empty containers should not be reused, and should be sent to landfill to be disposed of in an environmentally safe manner.

ITEM	AREA OF EXPERTISE	PROCEDURES AND MITIGATING MEASURES
		• There should be appropriate training prior to pesticide application that clarifies the risks and associated hazards and procedures to be adopted and the use of appropriate personal protective equipment required during application. • Children should not be involved in the handling/application of pesticides.
7	Disposal of Unused Packaging and Pesticides	• Empty pesticide containers and containers containing pesticide-treated seeds: (i) should be disposed of in a manner consistent with the pesticide label; or (ii) in the absence of specific instructions on the label, they should be washed three times and disposed of at designated disposal sites; and (iii) must not be sold or reused for any purpose. • Whenever possible, it is recommended to purchase pesticides that allow the return to the supplier, in case they are not needed. Some pesticide sellers and manufacturers accept the return of newly purchased unopened pesticide containers.
8	Distribution of Pesticides in Bulk.	• Bulk pesticides may be repackaged for sale or delivery if: (i) a representative of the registered establishment is present when the product is repackaged for sale or delivery; and (ii) there is no change in any of the following as a result of the repackaging: (iii) the formulation of the pesticide; (iv) product labeling, (v) scales and measurements used for bulk pesticide sales must meet specifications, tolerances and other technical requirements.
8	Custom Mixes or Combinations.	• They should be prepared according to the user's order, within the recommended range of pesticide labeling. • It should not be kept in storage or its portions, if divided for delivery, should be labeled with the actual percentage of the pesticide within the custom blend or blend, along with the pertinent and appropriate instructions for its use, purpose, and care. This requirement can be met by attaching a copy of the end-use label of the pesticides used in the mixture.

One of the factors that can limit the adoption of Integrated Pest Management (IPM) practices is the misperception that pesticides are modern "remedies", capable of providing a quick and effective solution to all problems affecting crops. This view reflects a significant barrier that needs to be overcome for the success of any IPM strategy. Success will depend not only on the project's ability to

establish a robust IPM program and integrate it with strategic partners, such as private companies and NGOs, but also on the active commitment of the various actors involved, including government, extension services, farmers, private organizations, and strategic partners.

For this commitment to be effective, it is necessary to invest substantially in training and capacity building, covering different aspects of IPM. The implementation of the Pest Management Plan (PMP), as detailed in the main document of the QGAS (Environmental and Social Management Framework) and the PEPI (Intervention Program Execution Plan), is a fundamental step in this process.

It is recommended that, at least in its initial phase, the management and facilitation of IPM within the project should be led by the Project Implementation Unit (PIU) in partnership with other actors. The IPU will be responsible for coordinating essential steps such as mobilization, participatory diagnosis, formulation of a detailed action plan with the involvement of key actors, implementation, monitoring, evaluation and feedback to the system, using lessons learned to improve the project and similar initiatives.

The IPU should work closely with the IPM focal points designated in the project. These focal points will act as mediators between operators and relevant agricultural services, including research and extension services, ensuring that the objectives of the programme are met.

Training will be a key component, and strategies such as engaging lead farmers or experienced growers should be prioritized. This model is already part of the extension system in Angola and has been used successfully in other areas, such as agricultural demonstrations. However, poor communication between farmers, extension workers, and other government actors can compromise the effectiveness of research and limit the adoption of promising solutions generated by investigations. Thus, it is essential that part of the training is conducted by the producers themselves, facilitating the sharing of experiences in a more practical and accessible way.

Finally, the exchange of experiences between different agricultural communities can play an essential role in strengthening the intended results, promoting joint learning that reinforces the adoption of sustainable and efficient practices. Such a collaborative approach will help overcome initial resistance and consolidate IPM as a viable and effective pest management strategy in the context of the project.

4.4.1 Pesticide Distribution

In Angola, the pesticide market is characterized by the coexistence of a regulated formal sector and a widely spread informal market, each playing distinct roles in the supply of these products. This configuration reflects the country's economic, social, and institutional conditions, including gaps in

enforcement, limited access to regulated products, and the reliance on intensive agricultural practices to address production challenges.

4.4.1.1 Formal and Informal Market

The formal market is made up of authorized distributors and traders, who operate in accordance with the regulations established by the National Directorate of Agriculture and Livestock (DNAP). The products sold in this market are mostly registered pesticides, with technical information available and compliance with safety standards. Imported mainly from China, Brazil and Portugal, these pesticides are purchased by commercial farmers and institutions with access to formal distribution channels. However, the formal market faces challenges such as high prices, which limit access for smallholder farmers, and limited coverage of retail outlets in rural regions. This difficulty in meeting all the demand, especially in remote areas, contributes to the strengthening of the informal market.

On the other hand, the informal market is an alternative widely used by smallholder farmers, due to the greater accessibility and reduced cost of products. In this segment, pesticides are often sold without adequate control or supervision. Many of these products are not registered or approved, and may be of low quality or even counterfeit, with unknown chemical composition.

Informality is associated with the entry of products through poorly monitored borders and the lack of effective regulation. Farmers often turn to this market because they are unaware of the risks associated with illegal pesticides or because of a lack of access to the formal market. Products sold in the informal market often lack labels, dosage information, or usage guidelines, resulting in poor application and storage practices.

The coexistence of formal and informal markets reflects both the lack of infrastructure and regulation and the economic and social disparities in Angola. While the formal market serves a specific portion of farmers with greater purchasing power and access to information, the informal market emerges as the only viable option for many small farmers who seek quick and economical solutions to pest problems.

This interaction creates challenges for the control of pesticide use in the country, increasing environmental, public health and agricultural productivity risks. Misinformation about the negative impacts of informal products and the lack of robust enforcement perpetuate this cycle, hindering the transition to a safer and more regulated market system.

4.4.2 Lack of Border Enforcement

The lack of border enforcement in Angola is a critical problem that reflects historical, geographical, and institutional challenges, directly impacting the entry and circulation of pesticides in the country. With an extensive land border shared with countries such as the Democratic Republic of Congo, Namibia, and Zambia, Angola faces significant difficulties in monitoring the entry of agricultural chemicals such as pesticides. Many of these border areas are remote and difficult to access, making it difficult for law enforcement agents to be present and allowing informal trade and smuggling networks to operate freely. As a result, illegal, unregistered, or dubious quality pesticides enter the country, feeding the informal market and endangering the environment, public health, and food safety.

This problem is compounded by the lack of adequate infrastructure and limited coordination between responsible government institutions such as customs, agriculture, and the environment. The absence of an integrated monitoring and inspection system allows banned chemicals or products with unknown compositions to cross borders without control, increasing the risks associated with their use. In addition, smuggling activities are often encouraged by the socio-economic reality of border regions, where informal trade is an important source of income for local communities. The high demand for cheap pesticides and the difficulty of access to regulated products in the formal market further aggravate the situation.

The lack of border enforcement not only compromises the regulation of pesticide use, but also reflects structural gaps affecting the Angolan agricultural sector. Illegal products often contain highly toxic substances that pollute the environment, contaminate soil and water resources, and endanger the health of farmers and consumers. Solving this problem requires investments in infrastructure, technical training of inspection agents, strengthening of regulations and awareness of farmers about the risks of using illegal pesticides. Addressing the issue is essential to ensure food security, protect the environment, and promote sustainable agricultural practices in Angola.

Therefore, the training of pesticide distributors in Angola is essential to ensure the safe and regulated marketing of these products, promoting agricultural practices that minimize negative impacts on public health, the environment and agricultural productivity. Well-trained distributors play a crucial role in guiding farmers on the correct use of pesticides, including dosages, application methods, and safety measures such as the use of Personal Protective Equipment (PPE). However, the lack of training among many distributors contributes to the sale of illegal or low-quality products, perpetuating unsafe practices in the agricultural sector.

Technical training should be central to capacity building, covering the safe handling, storage and transport of pesticides, as well as detailed knowledge about the products marketed, their chemical compositions and the potential associated risks. In addition, it is necessary to raise awareness among distributors about the regulations in force, ensuring that they only sell products that are registered and approved by the Angolan authorities. Education on sustainable practices, such as Integrated Pest Management (IPM), is also key to encouraging the sale of safer alternatives and reducing reliance on chemical pesticides.

4.5 ABILITY TO MANAGE/ELIMINATE OBSOLETE PESTICIDES AND CONTAMINATED PACKAGING.

The management of obsolete pesticides and contaminated packaging in Angola faces serious challenges due to the lack of adequate infrastructure, specific regulation, and awareness of safe practices. Obsolete pesticides, which include expired or banned products, are often stored in poor conditions, exposing communities and the environment to contamination risks. In addition, contaminated packaging is often disposed of inappropriately, either by open burning, dumping in rivers or agricultural soils, or even reused to store water and food, practices that pose serious threats to public health.

The absence of appropriate facilities for the safe treatment and disposal of this waste exacerbates the problem. Eliminating obsolete pesticides requires specialized processes, such as high-temperature incineration, which are expensive and often unavailable in the country. Similarly, there is no reverse logistics system that allows farmers to return used packaging for proper disposal, leaving them without safe alternatives. The lack of awareness among farmers and distributors about the risks associated with improper storage and disposal also contributes to the perpetuation of these practices.

The impacts of this mismanagement are significant as they contaminate soils, water resources and the air, causing biodiversity loss and compromising ecosystems. In public health, direct contact with obsolete pesticides or residues on packaging can lead to acute poisoning and chronic disease among farmers and nearby communities. Economically, the costs of environmental remediation and medical treatment, in addition to the degradation of productive land, generate considerable losses.

To address these issues, it is essential to establish adequate infrastructure for waste management, including facilities for treating obsolete pesticides and systems for collecting contaminated packaging. Public-private partnerships can be mobilized to finance and implement these solutions. Additionally, education and awareness campaigns are needed to inform farmers and distributors about the risks of

improper disposal and safe handling and disposal practices. Regulation must be strengthened, with the creation of clear policies that encourage adherence to safe practices and penalize infractions. Encouraging the use of biodegradable and less toxic pesticides can also reduce environmental impact.

However, investing in the management of obsolete pesticides and contaminated packaging is crucial to protect the environment, public health, and agricultural sustainability in Angola. With effective policies, appropriate infrastructure, and awareness, the country can mitigate the negative impacts of these wastes and promote more responsible agricultural practices.

In short, the application of the solutions requires coordinated efforts between government, the private sector, farmers and international organizations. By prioritizing the proper management of obsolete pesticides and contaminated packaging, Angola can minimize environmental and health risks, as well as promote more sustainable and safe agriculture.

4.5.1 Elimination of Obsolete Pesticides and Used Pesticide Packaging

To avoid the production of pesticide residues, one should preferably pay attention to their prevention and only then comply with the rules for their safe disposal or referral for safe disposal by others.

- Whenever possible, it is recommended to purchase pesticides that allow the return to the supplier, in case they are not needed. Some pesticide sellers and manufacturers accept the return of newly purchased unopened pesticide containers.
- If it is not possible to return it to the distributor/manufacturer, the pesticide can be donated to someone qualified to use it properly.
- If a particular pesticide is withdrawn from circulation, you should immediately contact the manufacturer listed on the product label. In these cases, manufacturers usually have plans for the collection of the sold packaging, for subsequent disposal.
- Normally, the label of products indicates how to dispose of small amounts of pesticides, namely pesticide remains, effluents resulting from washing application equipment or materials used for spill cleanup. You should never exceed the recommended application rate and follow all instructions. If decontamination solutions such as cleaning products, detergents, ammonia, chlorine solutions, and others are used to remove residues, it may be necessary to dilute them before they are disposed of, to avoid contamination.
- There may also be government-sponsored programs to collect unwanted and obsolete pesticides that can be used for the safe disposal of these wastes.

- If it is not possible to return it to the manufacturer or forward it through government collection programs, it will be necessary to find a company licensed by the environmental authorities to safely dispose of pesticide residues, in accordance with hazardous waste management procedures and Angolan law.

After full use of the products, empty containers or containers containing pesticide residues should be disposed of safely. For the effective elimination of empty containers, it is necessary to:

- The farmer qualified to handle pesticides must wash the empty containers immediately after emptying them, for this purpose manual washing can be done or pressure washing machines can be used. The water resulting from this washing must be emptied into the spray tank.
- The packaging must then be placed in specific containers for this purpose (closed and airtight suitable for hazardous waste), close to the place of use. The storage place for empty packages can be inside the pesticide warehouse.
- The collection of this packaging and its disposal must be carried out by companies licensed by the environmental authorities for the management of this waste, in accordance with the Law.
- The storage of this (hazardous) waste before it is handed over to an entity licensed for its management should not exceed 3 months.

PPE that is not in good condition, i.e. that is not in good condition for use, should be disposed of safely, as described above for pesticide packaging. The storage of this material must be carried out in a closed and airtight container, located in the Pesticide Warehouse, and the collection of this waste must be carried out by a company licensed for the management of this type of waste. Similarly, the storage of such waste before it is handed over to an entity licensed for disposal should not exceed 3 months.

5. POLITICAL, LEGAL AND INSTITUTIONAL FRAMEWORK FOR INTEGRATED PEST MANAGEMENT (IPM)

In the context of this project, effective Integrated Pest Management (IPM) can be achieved through strategic integration between Angola's policies and institutional framework, the country's prevailing practices, and Environmental and Social Standards, in addition to the African Development Bank's (AfDB) Health and Safety Guidelines. This approach seeks to align local practices with international standards, promoting sustainability, safety, and an implementation adapted to local realities.

The chapter reviews significant elements related to IPM, highlighting three main aspects. First, it analyzes Angola's main instruments and regulations, including environmental legislation, agricultural policies, and standards on pesticide use. These instruments are assessed for their relevance to the project, identifying how they can be applied to promote sustainable agricultural practices and mitigate environmental and social impacts. It then presents the AfDB's Environmental and Social Safeguards Standards, with an emphasis on those related to pesticide management, pollution prevention, occupational health and safety, and resource efficiency. These guidelines complement national regulations, providing a robust basis for aligning the project with global best practices.

Finally, the chapter compares the regulatory frameworks of Angola and the AfDB, identifying differences and gaps that may influence project implementation. Aspects such as normative alignment, institutional capacity and operational practices are analysed, and practical measures to harmonise the two systems are recommended. These include strengthening technical and institutional capacities, adapting local practices to international requirements, and implementing effective monitoring and evaluation mechanisms.

By promoting such alignment between national and international regulatory frameworks, the project ensures effective, sustainable and compliant implementation with global standards. This integration not only ensures compliance with AfDB requirements but also contributes to food security, environmental protection, and sustainable agricultural development in Angola.

5.1 CURRENT PLANT PROTECTION / VECTOR CONTROL SYSTEM (POLICY, INSTITUTION, ETC.)

5.1.1 Applicable Angolan Law

The management of environmental and social issues in Angola, especially in the agricultural and livestock sectors, is regulated by a set of legal instruments widely described in the Environmental and Social Impact Assessment (EIAS). This document, dedicated to integrated pest management (IPM),

addresses specific aspects related to pest management and the use of chemical products, with emphasis on pesticides and related products, essential for combating plant and animal diseases.

The legislation that regulates the use of pesticides and chemicals in Angola is dispersed in several laws and regulations, which, in some cases, makes it difficult to identify the main guidelines and critical aspects applicable in specific situations. This challenge is particularly evident in the context of the project, which covers multiple subsectors at different stages of consolidation in the national development scenario. However, the family sector and micro and small companies, which are the central focus of this work, have shown considerable maturity in combating pests, especially in agricultural production, which is more solid compared to livestock.

The main legal instruments regulating the management of pesticides and chemicals for pest control in Angola include the Plant Health Regulation (DSV), Law No. 5/21 of 3 February, also known as the Plant Health Law, is the legal basis for plant protection in Angola; Presidential Decree No. 93/16, of 9 May, which regulates Law No. 7/05, of 11 August, known as the Seed Law, and which defines guidelines for the production, marketing, import and export of quality seeds and seedlings, preventing the entry of materials harmful to Angolan agriculture; and the Decree on Environmental Auditing (Decree No. 1/10, of 13 January), which establishes environmental audit procedures, including the assessment of pest management practices.

Within the framework of this project, consultations were carried out with various target groups and stakeholders, including government bodies, the private sector, NGOs and business associations. Among the entities consulted are the Institute of Agricultural Development (IDA), the National Directorate of Agriculture and Livestock, the Institute of Veterinary Services (ISV), the Institute of Forestry Development, the Ministry of the Environment, the Association of Poultry Producers of Angola, the Coffee Institute of Angola (INCA), the Action for Rural Development and Environment (ADRA), commercial agriculture associations and the Business Confederation of Angola.

The information gathered from these interactions was instrumental in guiding the development of effective pest management strategies, aligned with global best practices and the specific needs of the Angolan context. These strategies are essential to ensure environmental and economic sustainability within the project.

5.1.1.1 Constitution of the Republic of Angola (CRA)

The Constitution of the Republic of Angola (CRA), in Article 39, guarantees citizens the right to a healthy and unpolluted environment, in addition to the duty to defend and preserve it. The article requires the

State to adopt measures to protect the environment, fauna, flora and ecological balance, in addition to ensuring the sustainable use of natural resources and punishing environmental infractions. It also highlights the importance of sustainable development, respecting the rights of future generations.

This framework is complemented by laws such as the Basic Law on the Environment (Law No. 5/98), which defines the general principles of environmental protection, and the General Regulation on Environmental Impact Assessment (Presidential Decree No. 117/20), which regulates the environmental impacts of economic activities. Institutions such as the Ministry of Culture, Tourism and Environment (MCTA) and the National Institute of Environmental Management (INGA) are responsible for the implementation and inspection of environmental policies.

Despite advances in the legal framework, Angola faces challenges in infrastructure, enforcement, and public awareness, but there are opportunities to strengthen environmental protection through international partnerships and sustainable technologies.

5.1.1.2 Basic Law on the Environment (Law No. 5/98, of 19 June)

The Basic Law on the Environment (Law No. 5/98, of 19 June) is the main legal framework for environmental protection in Angola, establishing the principles for the sustainable management of the environment. Based on Articles 5 and 6, the Act promotes sustainable development by integrating environmental issues into socio-economic planning and assigning responsibilities to the government, private sector and civil society to protect and manage the environment rationally.

The Act serves as the basis for further regulations and reinforces the importance of sustainability in all areas, requiring that Activities with environmental impact be assessed and mitigated. While it faces implementation and enforcement challenges, it remains essential to balance national development with the protection of natural resources and the well-being of future generations.

5.1.1.3 Regulation of the Environmental Impact Assessment process (Presidential Decree No. 117/20, of 22 April 2020)

Presidential Decree No. 117/20, of April 22, 2020, regulates the Environmental Impact Assessment (EIA) process in Angola, establishing the mandatory procedures for the analysis of projects with the potential to cause significant impacts on the environment. This regulation defines that all projects subject to environmental licensing must undergo a detailed assessment, conducted by the competent authorities, with the aim of identifying and mitigating possible negative impacts.

The decree specifies that the permitting process may include conditions and mitigating measures that proponents must adopt to minimize environmental damage during the implementation and operation of the projects. It covers strategic sectors such as agriculture, mining, energy, and infrastructure, requiring that any activity with potential significant environmental impact be properly evaluated before its approval.

This regulation reinforces Angola's commitment to sustainable development, promoting compatibility between economic growth and the protection of the environment, ensuring the conservation of natural resources and the well-being of current and future generations.

5.1.1.4 Regulation on water quality for public health, integrated management of water resources and environmental protection in Angola (Presidential Decree No. 261/11 of 6 October 2011)

Presidential Decree No. 261/11, of October 6, 2011, regulates water quality for public health, integrated water resources management and environmental protection in Angola. This decree establishes standards to ensure that water intended for human consumption is safe and free of harmful contaminants, ensuring public health and promoting the sustainable use of water resources. It also regulates the discharge of domestic and industrial effluents, preventing the contamination of rivers, lakes and aquifers, and defines control and inspection mechanisms to protect the country's water resources.

The decree promotes integrated water management, seeking to balance demand with the availability of resources and integrating various sectors in planning and sustainable use. In addition, it encourages community participation, highlighting the importance of environmental education and awareness for the adoption of practices that protect water resources. It also reinforces the need for a decentralized management and control system, promoting the articulation between institutions and policies that reconcile economic development with environmental protection.

This regulation is essential for the preservation of water resources and to ensure access to quality water, contributing to public health, environmental sustainability and the development of the country.

5.1.1.5 Regulating the general use of water resources in Angola, establishing rules for their management, use and preservation, based on the principles of sustainable development (Presidential Decree No. 82/14, of 21 April 2014)

Presidential Decree No. 82/14, of April 21, 2014, regulates the general use of water resources in Angola, establishing rules for their management, use and preservation, based on the principles of sustainable development. The decree seeks to ensure equitable access to water, protect aquatic ecosystems and promote the rational use of water resources, reconciling human, environmental and economic needs.

Among its objectives, the promotion of the sustainable management of water resources, ensuring their availability for future generations, the prioritization of the supply of water for human consumption over other uses and the implementation of measures to protect against pollution and degradation of rivers, lakes, aquifers and associated ecosystems stand out. The decree also regulates the intensive use of water in economic activities, such as agriculture, industry and energy generation, requiring prior licensing and promoting practices of efficiency in the use of resources.

This regulation reinforces Angola's commitment to integrated water resources management, ensuring a balance between economic development, environmental protection, and social well-being. It is essential to ensure access to quality water, protect ecosystems and promote sustainable practices that preserve the country's water resources.

5.1.1.6 Regulates waste management in Angola (Presidential Decree No. 190/12, of 24 August 2012)

Presidential Decree No. 190/12, of August 24, 2012, regulates waste management in Angola, establishing standards and procedures for management, treatment and proper disposal, with the aim of protecting the environment, public health and promoting sustainable development. This regulation defines guidelines for the integrated management of waste, from generation to treatment and final disposal, covering domestic, industrial, hazardous and hospital waste.

The decree assigns responsibilities to waste generators, transporters and operators, requiring appropriate practices to prevent environmental impacts and risks to public health. It also encourages the reduction of waste generation, recycling and reuse, promoting sustainable practices. In addition, it establishes that Activities related to the transport, treatment and disposal of waste must be licensed, ensuring compliance with environmental standards.

This regulation is essential to ensure that waste in Angola is treated safely and responsibly, contributing to the protection of natural resources, the well-being of communities, and public health. Its effective implementation is a fundamental step for the sustainable development of the country.

The legal framework applicable to the Environmental and Social Impact Assessment reflects these advances and establishes the basis for coordinated actions that consider both the environmental challenges and the social needs of the country. These measures are essential to align Angola with the best international sustainability practices, ensuring the protection of the environment and the well-being of its populations.

With regard to plant protection and vector control in Angola, the system is structured through a set of policies, legislations and institutions that play key roles in safeguarding plant health and combating pests that affect agriculture and public health. Among the most relevant elements are:

- **Phytosanitary Policy:** The Angolan phytosanitary policy aims to protect the national territory against the introduction, establishment and dissemination of pests, diseases and other agents harmful to plants. This is achieved through the implementation of preventive and control measures, ensuring the health of the plants and their products throughout the production process, including import and export. The policy also seeks to harmonize national phytosanitary standards with international standards, promoting international cooperation and environmental sustainability.
- **Applicable Legislation:** The legal basis for phytosanitary protection in Angola is established by Law No. 5/21 of February 3, known as the Plant Health Law. This law defines the rules to ensure the phytosanitary protection of agricultural and forestry production, as well as regulates the transit, trade, import and export of plants, plant parts and regulated objects intended for commercialization and consumption. The law emphasizes principles such as prevention, public participation, sovereignty, accountability, international cooperation, technical justification, transparency, harmonization, non-discrimination, sustainability, and equivalence.
- **Responsible Institutions:** The Ministry of Agriculture and Forestry (MINAGRIF) is the government entity responsible for the formulation and implementation of policies related to agriculture, livestock, and forestry, including phytosanitary protection. Within MINAGRIF, there are specific departments in charge of inspection, supervision and phytosanitary control, ensuring the health of the plants and compliance with the established standards. In addition, the National Civil Protection and Fire Service plays a role in controlling vectors that affect public health, in coordination with the Ministry of Health.

- **Vector Control:** Vector control in Angola is a shared responsibility among several institutions, including the Ministry of Health, which implements programs to control vector-borne diseases such as malaria. These programs involve measures such as indoor residual spraying, distribution of insecticide-impregnated bed nets, and public awareness campaigns. Collaboration between different sectors is essential for the effectiveness of these initiatives.

Despite advances in legislation and institutional structure, Angola faces challenges in the effective implementation of phytosanitary and vector control policies. The need for continuous updating of standards, training of human resources, strengthening of infrastructure, and improvement of inter-institutional coordination are areas that require attention to ensure adequate protection of plants and public health in the country.

In summary, the plant protection and vector control system in Angola is underpinned by a legal and institutional framework that seeks to align with international best practices. However, the effectiveness of this system depends on the practical implementation of policies, the training of the professionals involved and the collaboration between the various responsible institutions.

5.1.1.7 Law No. 5/21, of February 3, known as the Plant Health Law

Law No. 5/21, of February 3, aims to ensure the phytosanitary protection of agricultural and forestry production in Angola. This legislation establishes measures to prevent, control and eradicate pests and diseases that may affect plants, ensuring the quality and safety of agricultural and forestry production. In addition, it promotes the adoption of good agricultural practices and establishes standards for inspection, supervision and phytosanitary control, contributing to the sustainability and protection of national ecosystems.

5.1.1.8 Joint Executive Decree No. 527/21, of October 5, in turn, approves the Legal Regime of Fees and Emoluments charged by the National Waste Agency (ANR).

This decree regulates the collection of amounts related to the services provided by the ANR, establishing criteria for the collection and application of these fees. The initiative aims to strengthen waste management in the country, ensuring resources to implement control, inspection and promotion of sustainable practices in waste management, in line with environmental and public health guidelines.

Both legal instruments represent important advances for the strengthening of environmental and agricultural policies, promoting greater efficiency and sustainability in the agricultural and waste management sectors.

5.1.1.9 Presidential Decree No. 196/12 of 30 August, Strategic Plan for Urban Waste Management

Presidential Decree No. 196/12, of 30 August, establishes the Strategic Plan for Urban Waste Management (PESGRU) in Angola, with the aim of creating an integrated and sustainable system for the management of urban waste, ensuring environmental protection, public health and the quality of life of the population. The plan aims to promote the proper management of urban waste, reduce the environmental and health impacts resulting from improper management, encourage the recycling, reuse and recovery of waste, in addition to establishing an efficient system for the collection, transportation, treatment and final disposal of waste. Among the components of PESGRU are the construction of infrastructures such as landfills and facilities for treatment and final disposal, environmental education to sensitize the population about responsible waste management, the implementation of rules and regulations to ensure compliance with the plan, and the promotion of partnerships between the government, the private sector, and civil society to enable effective actions. The goals include the implementation of selective collection systems in urban areas, the creation of programs to encourage the recycling and reuse of materials, the training of technicians and managers in the area of solid waste and the continuous monitoring of the conditions of urban waste for adjustments to the plan, when necessary. The decree reflects the government's commitment to sustainable development and reinforces the need for structured actions to address the challenges of waste management in cities.

5.1.2 International Guidelines on the Use of Pesticides

Since the initial adoption of the Code of Conduct on Pesticide Management in 1985, a number of important international instruments have been introduced, significantly enhancing the global framework for pesticide regulation and management. These instruments have played a crucial role in establishing standards and guidelines for safer, more efficient, and environmentally responsible practices. Some of the most relevant include:

5.1.2.1 Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade

The Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, adopted in 1998, is an essential international instrument that promotes transparency and shared responsibility in trade in hazardous chemicals and pesticides. Its main objective is to ensure that countries are properly informed about the risks associated with these substances and have the opportunity to decide whether or not to authorize their importation.

The convention establishes the Prior Informed Consent (PIC) Procedure, which requires exporting countries to notify importing countries of their intention to market substances listed in the convention. This allows importing countries to assess risks and make informed decisions in line with their regulatory and management capabilities.

In addition, the Rotterdam Convention promotes international cooperation and information sharing on hazardous chemicals and pesticides, contributing to the protection of human health and the environment. By requiring explicit consent before export, it reinforces the rights of countries to regulate the entry of potentially harmful substances, especially in developing countries that may face limitations in infrastructure and regulatory capacity.

This convention is a milestone for strengthening global governance of chemicals, promoting safer and more responsible business practices, and helping to prevent harm associated with the misuse of hazardous substances. In Angola and other countries, its implementation is a key step towards consolidating the sustainable management of chemicals and pesticides.

5.1.2.2 FAO Guidelines on Good Practice for Terrestrial Application of Pesticides (2001)

The FAO Guidelines on Good Practice for Terrestrial Application of Pesticides (2001) were developed to support decision-makers, managers, field supervisors and spray operators in the safe and efficient use of pesticides. These guidelines offer technical and operational guidelines that seek to minimize environmental and human health risks, promoting effectiveness in pest control.

It is important to note that, in many countries, there is already legislation in place to regulate the use and application of pesticides. In this context, FAO guidelines should be seen as a complement to local standards or voluntary codes. Compliance with national legislation should be prioritized, as it can have legal implications, especially in cases of litigation involving the field performance of a pesticide.

These guidelines reinforce the importance of following safe and regulated practices, highlighting the need for proper training, the use of personal protective equipment (PPE), the calibration of spraying equipment, and ongoing monitoring during operations. Its application promotes a responsible approach to pest management, contributing to environmental safety and the protection of the health of operators and nearby communities.

5.1.2.3 Stockholm Convention on Persistent Organic Pollutants (POPs)

The Stockholm Convention on Persistent Organic Pollutants (POPs), adopted in 2001, is an international agreement that aims to protect human health and the environment by eliminating or restricting the production and use of persistent organic pollutants. POPs are highly toxic chemicals that remain in the environment for long periods, accumulate in living organisms through the food chain, and pose significant risks to health and biodiversity. The convention lists substances considered POPs, including pesticides, industrial chemicals, and unintended by-products of industrial processes.

Signatory countries commit to eliminating or restricting the use of POPs, developing national plans to manage existing stocks, promoting less toxic alternatives, and preventing the release of these products into the environment. The convention also establishes measures for the safe management of contaminated waste, technical assistance for developing countries, capacity building to implement the guidelines and a global monitoring system to assess the levels of POPs and their impacts.

The Stockholm Convention is a milestone in global environmental governance, playing an essential role in reducing the risks associated with persistent chemicals. Its implementation in countries like Angola is crucial to protect vulnerable communities, preserve natural resources, and promote more sustainable agricultural and industrial practices.

5.1.2.4 Strategic Approach to International Chemicals Management (SAICM)

The Strategic Approach to International Chemicals Management (SAICM) is a global policy framework established in 2006, which seeks to promote the safe management of chemicals throughout their entire life cycle, from production to disposal. The primary objective of SAICM is to minimize the adverse effects of chemicals on human health and the environment by ensuring that these products are used and managed responsibly and sustainably by 2020 and beyond.

SAICM promotes the integration of safe practices by encouraging national policies and legislation that address the safe management of chemicals in sectors such as agriculture, healthcare, and industry. In addition, it provides technical support and capacity building to developing countries, allowing the

implementation of effective strategies adapted to their realities. Life cycle management is a core component, addressing the risks of chemicals at all stages, including production, storage, transportation, use, and disposal.

The initiative also prioritizes replacing hazardous chemicals with safer alternatives, raising awareness of the risks associated with their use and strengthening global chemical governance. With a focus on sustainable development and the protection of public health, the SAICM plays a crucial role in countries such as Angola, where strengthening the management of chemicals is essential to ensure environmental safety and the well-being of populations.

5.1.2.5 International Plant Protection Convention (IPPC), established in 1952

The International Plant Protection Convention (ICPF), established in 1952, is an international treaty under the aegis of FAO that promotes collaborative actions to prevent the introduction and spread of pests in plants and plant products, protecting plant health and facilitating the safe trade of agricultural products.

Governed by the Commission on Phytosanitary Measures (CPM), the CIPF adopts the International Standards for Phytosanitary Measures (ISPMs), which provide guidelines for the implementation of consistent and effective phytosanitary measures. These standards cover various aspects, such as inspection, quarantine, phytosanitary certification and pest control, ensuring that signatory countries adopt harmonized practices to protect their plant resources.

The implementation of the PMP reinforces MINAGIF's commitment to preventing the spread of pests of plants and plant products. This global effort highlights the importance of sound phytosanitary practices to protect biodiversity, food security, and agricultural trade.

MINAGRIF plays an essential role in empowering countries to implement effective phytosanitary measures, promoting international cooperation and ensuring the protection of plants, both at the regional and global levels, against pests that can cause significant economic, environmental and social impacts. In Angola, its implementation is vital to strengthen plant health, support the agricultural sector, and protect natural resources.

5.1.2.6 Declaration on World Food Security and Plan of Action, adopted in November 1996

The Declaration on World Food Security and the Plan of Action, adopted in November 1996, emphasizes the importance of effectively preventing and controlling pests and diseases affecting

plants and animals, especially those of a transboundary nature, such as rinderpest, cattle ticks, foot-and-mouth disease and desert locusts. These outbreaks pose a significant threat to food security, and can cause severe food shortages, affect local and regional economies, and compromise the well-being of populations.

The plan promotes regional collaboration in pest and disease control, recognizing that coordinated actions between countries are essential to mitigate the risks of transboundary pests and diseases. It also encourages the development and adoption of Integrated Pest Management (IPM) practices as a sustainable strategy to reduce the use of chemical pesticides, protect the environment, and ensure the health of populations.

The implementation of the project reinforces the commitment to the guidelines of this Action Plan, promoting global efforts to prevent the spread of pests and diseases, protect food systems and ensure an integrated approach to plant and animal health. This commitment is essential to strengthen agricultural resilience, ensure food security, and promote sustainable agricultural practices at the global level.

5.1.2.7 FAO Guidelines on Management Options for Empty Pesticide Containers (2008)

The FAO Guidelines on Management Options for Empty Pesticide Containers (2008) offer guidance on how to deal with disposable pesticide containers after their contents have been used, addressing the risks they pose to human health and the environment. When not properly managed, empty containers can be reused improperly, such as for food and water storage, resulting in pesticide poisoning. In addition, the abandonment of these containers in the environment can lead to soil and groundwater contamination.

The guidelines emphasize that an effective container management scheme is essential to minimize these risks and integrates the "life cycle concept" as outlined in the International Code of Conduct on Pesticide Distribution and Use. The safety of pesticide users and the public is the primary concern when designing and implementing these schemes.

For the success of such schemes, the engagement and support of all stakeholders in the pesticide supply chain is critical. This includes government agencies, manufacturers, users, distributors, suppliers, recyclers, disposers, NGOs, and trade unions. The guidelines detail how each of these parts can contribute to an efficient management scheme. For example, manufacturers have an important

role to play in designing containers that are easier to handle and dispose of safely, as well as in formulating products that reduce waste and toxicity.

When implementing a container management scheme, the guidelines recommend considering safe recycling or proper disposal, promoting awareness of the risks associated with empty containers, and ensuring that everyone involved takes responsibility for the pesticide life cycle. These measures are essential to protect the environment, public health, and the sustainability of agricultural practices.

5.1.2.8 FAO/WHO International Code of Conduct on Pesticide Management: Guidelines for Personal Protection when Handling and Applying Pesticides (2020)

The FAO/WHO International Code of Conduct on Pesticide Management: Guidelines for Personal Protection when Handling and Applying Pesticides (2020) was developed by the Joint FAO/WHO Meeting on Pesticide Management (JMPM). These guidelines update previous versions from 1990 by providing practical guidance and policies to protect agricultural and public health operators and applicators from the risks associated with pesticide exposure. They reflect a joint approach by FAO and WHO aimed at safe pesticide management and risk reduction.

The guidelines are primarily aimed at reducing pesticide exposure through the effective use of Personal Protective Equipment (PPE) by providing detailed technical information on the selection, use, and maintenance of such equipment. In addition, they address policy issues, recommending measures to improve the availability, accessibility, and quality of PPE, especially in low- and middle-income countries (LMICs), where there are significant limitations in legislation, compliance, and enforcement of safety standards.

The document is aimed at government authorities responsible for pesticide management and risk reduction, but it also benefits other sectors, such as the pesticide industry, NGOs and the private sector. He highlights the importance of public policies that promote the safe use of PPE and ensure its accessibility for all operators, in addition to addressing practices for training, awareness and inspection. These measures are essential to mitigate health risks and improve the safety of workers exposed to pesticides in agricultural and public health contexts.

5.2 ANALYSIS OF THE CAPACITY, AT NATIONAL AND LOCAL LEVEL, TO IMPLEMENT GIP IN THE COUNTRY

The effective implementation of Integrated Pest Management (IPM) in Angola depends on technical, institutional and operational capacity at national and local levels. This process requires collaboration

between different sectors, adequate training of farmers and technicians, infrastructure for pest monitoring and control, and robust regulation to ensure sustainable practices. Below, the existing capacities and challenges for the implementation of IPM in the country are analyzed, with an emphasis on the specific area or sector of the project.

Despite the continued efforts made by the various government-led agrarian projects, pesticide management capacity remains relatively weak in Angola. A series of institutional constraints are noted in the form of (i) deficient coordination; (ii) dependence on external financing; (iii) deficient application of the law; (iv) inconsistency and discontinuity in the implementation of programs; (v) insufficient staff; and (vi) deficient allocation of resources; (vii) incoherence and discontinuities in applied and adaptive research and capacity development. These are considerable obstacles to the proper and consistent policymaking, implementation, monitoring, and evaluation of PMP. Some examples include: (i) pesticide residues are not being properly monitored on crops/export products and even for those destined for the domestic market in such a way that isolated events (e.g. in the media) are reported from time to time, but pesticide poisoning statistics are not available; (ii) medical teams in rural clinics are not trained to recognize and adequately treat pesticide poisoning; and (iii) antidotes are not systematically available in rural areas and in certain provincial and municipal urban centers in more remote areas.

Inspection personnel at the provincial level report that the few random inspections that are carried out and uncover non-compliance by different types of operators, including by large agricultural producers in the form of:

- Obsolete pesticides.
- Inadequate labeling.
- Use of pesticides without the proper equipment.

This contributes to increasing the risk of contamination and use of pesticide packaging for domestic use, which is washed into rivers and puts at risk of contamination of water and soil, etc. It should be noted that inappropriate actions generate risks for the health of people and animals, as well as for the biota in general, which makes the WB's approach to the integrated management of pests and their pesticides even more relevant.

All aspects combined make the adoption of IPM under the Project mandatory. Local actors recognise that the IPM strategy itself will be a serious challenge, as it will be necessary to keep a number of factors under control to ensure that the essential elements of IPM are adopted and put into practice.

This is one more reason to justify a well-thought-out and structured action plan that includes the mobilization and training of people, institutions and resources.

5.2.1 National Capacity

The national capacity to implement Integrated Pest Management (IPM) in Angola is influenced by institutional, technical and financial factors. While there are policies and legal frameworks that underpin pest management, such as the Plant Health Law (Law No. 5/21), infrastructure, coordination, and capacity building challenges still limit the effective application of these initiatives. The institutions involved are as follows:

- **Ministry of Agriculture and Forestry (MINAGRIF):** It is the central entity in the formulation and implementation of phytosanitary policies and IPM practices. It oversees pest control programs and regulates pesticide use.
- **Institute for Agronomic Research (IIA**): It works in the development of local solutions, such as biological control and cultural practices appropriate to the Angolan context, but faces financial constraints that limit its reach.
- **Other Entities**: Regional and local institutions support implementation, but face challenges related to coordination and insufficient resources.

Under the direct management of the IPU through the environmental and social safeguards officers, MINAGRIP/IDA and especially the promoters of the subprojects (Provinces/Municipalities and other provincial or central entities) will be responsible for the implementation of pest management processes, ranging from the formulation of the plans, through their implementation and subsequent monitoring and evaluation/audit. They will be able to outsource part of the services to entities specialized in the different topics to ensure that the entire process takes place in a participatory, inclusive and professional way.

However, MINAGRIF is the institution responsible for the approval and registration of pesticides in Angola. The department of agriculture and economy, in the National Directorate of Agriculture and Veterinary, is responsible for the management of pesticides produced, imported and used in Angola at the national level. In addition to managing pesticides, this department is also responsible for other relevant tasks, such as the Pest and Disease Division and Plant Quarantine Division.

The pesticide management section needs to be fortified as it currently has two technicians for the whole country. This section is supposed to license importers and exporters of pesticides and fertilizers, license traders and distributors of these products which due to limited staff is not fully ensuring this

work throughout the country. In the past, registration and approval for importation were preceded by laboratory tests at the Institute of Agronomic Research, which is currently not performing these tests.

For a successful implementation of this PMP, UIP will recruit environmental and social protection experts to coordinate the implementation of the Project. The IPU will be supported by several agencies, including other departments of MINAGRIF, especially the National Directorate of Agricultural and Veterinary Services, agricultural research institute, National Seed Server (SENSE).

5.2.2 Local Capacity

Local capacity to implement Integrated Pest Management (IPM) in Angola presents significant challenges, varying by region and being influenced by factors such as limited infrastructure, lack of knowledge of farmers, and lack of adequate technical support. In many remote areas, infrastructure for pest monitoring and control is insufficient, with a shortage of equipment, tools, and data collection systems. Additionally, local phytosanitary services are restricted, making it difficult to respond to pest outbreaks effectively and in a timely manner.

Technical assistance is also limited, with few trained technicians to guide farmers on sustainable pest management practices, such as biological control and cultural management. This scenario is aggravated by the widespread lack of knowledge of the principles and benefits of IPM, which leads to the predominant dependence on chemical pesticides as a primary solution. Many local farmers still use traditional or empirical practices that are not always aligned with IPM principles, while sustainable inputs such as biological control agents and low-toxicity pesticides are scarce or economically inaccessible to smallholders.

These limitations are exacerbated by the lack of infrastructure for pest monitoring, economic barriers that restrict access to adequate inputs, and the absence of educational campaigns on the benefits of IPM. Despite these challenges, there are opportunities to strengthen local capacity through investments in regular training programs for technicians and farmers, the creation of regional pest monitoring centers, increased availability of sustainable inputs, and community engagement campaigns.

Implementing targeted strategies can transform IPM adoption by promoting more sustainable agricultural practices, reducing reliance on chemical pesticides, and improving the resilience of farming communities. With technical, financial and institutional support, local capacities can be significantly expanded, contributing to more sustainable and efficient agriculture in Angola.

Although Angola has an institutional and legal framework to implement GIP, there are still significant challenges in terms of infrastructure, capacity building and awareness, especially at the local level. With strategic investments in technical resources, training, and awareness-raising, GIP can be an effective tool to promote sustainable agricultural practices and improve food security in the project sector.

Then, the successful implementation of this PMP, will rely on experts from the provincial IDA to coordinate the implementation of the Project. This will also have the support of several agencies, including other departments of MINAGRIF, especially the National Directorate of Agricultural and Veterinary Services, agricultural research institute, National Seed Server (SENSE).

5.3 PROMOTE INTEGRATED PEST MANAGEMENT IN THE CONTEXT OF CURRENT PEST MANAGEMENT PRACTICES.

The Integrated Pest Management Plan (IPMP) in the context of current management practices is essential to increase agricultural productivity while preserving the ecological balance and minimizing environmental impacts. This chapter presents the steps needed to implement an effective IPM program, integrating sustainable strategies and best practices in pest management.

5.3.1 Objectives of the PGIP

The main objective of the Integrated Pest Management Plan (PGIP) is to increase the production and productivity of irrigated crops in an environmentally sustainable way. Its specific objectives include:

- Identify pests that affect crops.
- Develop sustainable control strategies.
- Select more resistant or pest-tolerant crops.
- Address challenges related to pest management.
- Provide recommendations to improve agricultural productivity.

5.3.2 PGIP Implementation Team

The implementation of the PGIP requires a diverse committee, led by the Director of the Institute of Agrarian Development (IDA). The committee is expected to include experts in crop protection, public health, agronomists and representatives of farmers' associations. Leadership will be based on

principles of sustainability and environmental conservation, with a focus on setting clear goals, measurable indicators, and a detailed timeline for implementation.

5.3.3 Delivery of the PGIP Objectives

The objectives of the program will include setting deadlines, budgeting required, monitoring pests, and reducing pesticide use. Baseline studies and visits to similar ongoing projects will help develop a practical and informed approach.

5.3.4 Analysis of Current Practices

Existing practices will be evaluated to identify opportunities for alignment with PGIP principles. Structural maintenance and sanitation strategies will be incorporated to prevent pest infestations and improve the efficiency of irrigation systems.

5.3.5 Regular Inspections

The program will include frequent inspections at hotspots such as irrigation canals, shelter sources, and pest feeding. Trained experts will conduct audits to ensure the effectiveness of the measures implemented and identify potential adjustments.

5.3.6 Definition of Treatment Options

Farmers will receive training on chemical and non-chemical control methods, prioritizing sustainable and safe options. Continuous monitoring will allow for quick adjustments to respond to new challenges.

5.3.7 Communication Protocols

Clear protocols will be established to facilitate communication between the GIP Committee, farmers and other stakeholders. This will include documentation of occurrences, regular meetings to assess progress, and management of emergency situations.

5.3.8 Farmer Training

Capacity building sessions will be organized to teach GiP principles , safe pesticide use practices, and documentation strategies. Leading farmers will play a crucial role in spreading knowledge in their communities.

5.3.8.1 Training and Awareness

Training and awareness are fundamental pillars to promote Integrated Pest Management (IPM) effectively in Angola. These actions seek to equip farmers, technicians and local communities with the knowledge, skills and motivation to adopt sustainable pest control practices. One of the central elements is training, which should be carried out regularly to train farmers and technicians in the principles and practices of IPM, such as biological control, cultural management and pest monitoring. This includes the use of natural enemies, practices such as crop rotation, and techniques to identify pests and adopt preventive measures at the right time, with practical and theoretical training tailored to local needs.

Community education is another essential point, with the aim of raising awareness among farmers and local communities about the benefits of IPM and the negative impacts of indiscriminate pesticide use. Awareness campaigns can be carried out in farming communities, using community radios, workshops and events to explain the environmental and health risks associated with pesticide use and how IPM can increase productivity and reduce costs. It is also important to involve schools and young people in educational activities to create a knowledge base on sustainable agricultural practices.

The dissemination of information is also crucial, with the creation of educational materials, such as leaflets, booklets and videos that clearly explain the steps of GIP. This information should be translated into local languages and adapted to the cultural realities of the target communities. In addition, digital platforms, such as social networks and websites, can be used to share information and offer remote technical support, expanding the reach of training and awareness initiatives. These integrated efforts are essential to promote the adoption of IPM, creating more sustainable and resilient agricultural systems.

5.3.8.2 Strengthening Local Infrastructures

Strengthening local infrastructure is key to effectively implementing Integrated Pest Management (IPM) in Angola, providing technical and operational support to farmers and communities. One of the

main actions is the establishment of regional pest monitoring and control centers, strategically located in priority agricultural areas. These centers must be equipped with qualified human resources to monitor, identify and propose rapid and effective interventions against pests, in addition to facilitating the exchange of information between technicians, farmers and research institutions. It is also essential that these centres carry out regular diagnoses of regional phytosanitary conditions, providing data for decision-making within the scope of the IPM.

Another crucial element is the provision of appropriate equipment and tools for integrated pest management. This includes traps for monitoring, such as pheromones and light traps, biological agents for natural pest control, remote sensing technologies, such as drones, to identify areas of high infestation, and personal protective equipment (PPE) to ensure safety in the handling of inputs. In addition, it is necessary to develop adequate infrastructure for the safe storage of inputs, such as biological pesticides.

These initiatives aim to enable faster and more effective responses to pest outbreaks, expand the adoption of IPM and strengthen local capacities, promoting more sustainable and resilient agriculture. The creation of well-structured and equipped local infrastructures is essential to ensure continuous support and access to modern technologies, contributing to the sustainability and efficiency of agricultural production in Angola.

5.3.8.3 Sustainable Alternatives

The promotion of sustainable alternatives is essential to implement Integrated Pest Management (IPM), reducing dependence on chemical pesticides and promoting practices that protect the environment, public health, and biodiversity. Among these alternatives, biological control stands out as an effective approach, using natural organisms, such as predators, parasites and microorganisms, to control pest populations. This may include the introduction of specific biological agents, such as ladybugs, trichogram and entomopathogenic fungi, as well as the conservation of natural habitats that favor the presence of these natural enemies. Empowering farmers in the safe and effective use of biological products is a crucial step for the success of this practice.

Another sustainable alternative is the adoption of cultural practices that alter the agricultural environment in order to hinder the proliferation of pests and diseases. This includes implementing crop rotation to disrupt pest life cycles, intercropping, combining crops that repel or reduce pest attraction, and proper soil management such as deep plowing and mulch to eliminate pest refuges. Adjusting the planting schedule to avoid periods of increased pest pressure is also an effective strategy.

In addition, the introduction of resistant plant varieties is a valuable alternative to reduce the need for chemical interventions. The use of certified seeds, with proven resistance to common pests in the region, should be encouraged, as well as partnerships with research institutions for the development of varieties adapted to local climatic and soil conditions. Informing and empowering farmers about the benefits of these varieties is key to promoting their large-scale adoption.

These sustainable alternatives not only contribute to the efficiency of IPM but also strengthen the resilience of agricultural systems, promoting more balanced and sustainable production.

These initiatives are promoted mainly through Farmers' Field Schools (ECAs), in cooperatives and associations, with the support of rural extension technicians from the Institute of Agrarian Development (IDA) and have already been disseminated as a practice in several provinces.

5.3.8.4 Regulation and Supervision

Regulation and enforcement are essential elements to promote Integrated Pest Management (IPM), ensuring that agricultural practices are carried out in a sustainable, safe and compliant manner with environmental and phytosanitary standards. One of the pillars is the establishment of specific standards that define the criteria for pest management, including the updating and harmonization of national legislation with international standards, such as those of the World Health Organization (WHO) and the International Phytosanitary Protection Convention (IPPC). These standards should prioritize the use of less toxic pesticides that are compatible with IPM, in addition to regulating the management and disposal of waste, minimizing environmental and public health impacts.

The control and registration of products is also important, ensuring that only safe and effective pesticides are used. To this end, it is necessary to implement registration systems and prohibit the import, sale and use of highly toxic products or products banned in other countries. Regular enforcement should be strengthened, with specialized teams that monitor pesticide use, farming practices, and compliance with standards. Strict penalties should be applied for infractions, such as the inappropriate use of chemicals and the absence of safe disposal practices.

Another key point is the training of inspectors and technicians, ensuring that they are prepared to apply regulations and monitor agricultural practices. In addition, it is essential to involve farmers, cooperatives, and distributors in compliance with the standards, through partnerships and educational campaigns that disseminate information about the benefits of GIP compliance.

Continuous monitoring of practices and publication of regular reports on pesticide use and GIP results are necessary to assess the effectiveness of regulations and identify areas for improvement. These actions contribute to the expanded adoption of IPM, promoting environmental, food and public health security, while ensuring the transition to more sustainable and responsible agricultural practices.

5.3.8.5 Partner Engagement

Partner engagement is essential to expand the adoption of Integrated Pest Management (IPM), promoting synergies between different actors to strengthen agricultural sustainability. Fostering partnerships between government, NGOs, research institutions, and the private sector is a central strategy for mobilizing resources, technical expertise, and innovation. These collaborations can facilitate the implementation of IPM programs, the dissemination of good practices, and the development of solutions adapted to local realities.

In addition, working with international organizations is critical to ceasing technical and financial support, allowing IPM initiatives to be scaled up and strengthened. Partnering with global institutions can bring advanced technologies, specialized training, and financial assistance to support farmer capacity building, biological control research, and the implementation of pest monitoring systems. This joint engagement contributes to the creation of a robust network of support for IPM, promoting more resilient, productive, and environmentally responsible agricultural practices.

5.3.8.6 Incentive to Research and Development

Encouraging research and development is a crucial pillar for the success of Integrated Pest Management (IPM), allowing the creation of solutions adapted to the specific conditions of each region. Investing in applied research is essential to develop practices that consider local climatic, agricultural, and cultural particularities, ensuring greater effectiveness and acceptance by farmers.

In addition, testing and validating innovative pest management methods is key to introducing approaches that are not only technically effective but also economically accessible. This includes the development of biological control agents, pest monitoring techniques, and cultural practices that minimize reliance on chemical pesticides. These initiatives strengthen the scientific and practical basis of GIP, contributing to a more sustainable, productive and resilient agriculture to climate change.

5.3.8.7 Monitoring and Evaluation

Monitoring and evaluation are essential components for the success of Integrated Pest Management (IPM), allowing for the early detection of problems and continuous analysis of the effectiveness of the practices implemented. Robust monitoring systems help identify pests at early stages, facilitating timely interventions that minimize crop damage and reduce the need for chemical pesticides. These systems also contribute to adjusting IPM strategies based on real data, promoting more adapted and efficient practices.

Evaluation should be supported by clear and measurable indicators to monitor the impact of interventions. Examples include reducing the use of chemical pesticides, increasing agricultural productivity, improving soil health, and the presence of natural enemies in cultivated areas. This data is critical to identifying successes, correcting failures, and justifying continued investments in GIP.

By combining proactive monitoring and continuous evaluation, it is possible to ensure that GIP is implemented in an effective, sustainable and aligned manner with local needs. This not only improves agricultural results but also contributes to environmental protection and public health, cementing IPM as a core practice in sustainable agricultural development.

6. INTEGRATED PEST MANAGEMENT (IPM) MEASURES OF THE PROJECT

The implementation of Integrated Pest Management Measures (IPMP) in the project is a strategic approach aimed at the sustainable control of agricultural pests and the mitigation of the environmental and social impacts associated with the indiscriminate use of pesticides. PGIP seeks to integrate different methods of biological, cultural, chemical and physical control, in a harmonised way and adapted to the specific conditions of the project areas, promoting more balanced and effective agricultural practices.

In the context of the project, PGIP measures are key to addressing local challenges, such as increased pest resistance to chemical pesticides, environmental contamination, and public health risks due to the inappropriate use of these products. At the same time, they respond to the need to ensure agricultural productivity and food security in regions where agriculture is an essential activity for livelihoods and the local economy.

PGIP measures are aligned with national and international guidelines, such as Angola's Plant Health Law, FAO's International Code of Conduct on Pesticide Management, and standards set by global conventions, such as the Rotterdam Convention and the Stockholm Convention. This ensures that the

project adopts practices consistent with the objectives of sustainable development and environmental protection. The IPMM in the project are designed to:

- Reduce the use of chemical pesticides and prioritize the biological control method, as well as cultural practices that minimize dependence on chemical inputs.
- Strengthen local capacity by training farmers and technicians in sustainable pest management methods and providing access to necessary technologies and inputs.
- Promote sustainable alternatives, through the use of natural enemies, crop rotation, resistant varieties and agricultural practices adapted to local conditions.
- Ensure environmental and health safety through the implementation of safe pesticide application practices, proper waste disposal, and continuous monitoring of environmental conditions.
- Foster strategic partnerships, through the involvement of public institutions, NGOs, the private sector and local communities to create a robust support network for the implementation and sustainability of the PGIP.

By integrating these measures into the project, it is hoped to achieve a balance between crop protection and environmental sustainability, ensuring better living conditions for local communities and promoting more resilient agriculture adapted to climate change. The contextualization of the PGIP within the project reinforces the commitment to modern, safe and responsible agricultural practices, aligned with the priorities of sustainable development in Angola.

6.1 RELEVANT ACTIVITIES PROPOSED FOR INTEGRATED PEST/VECTOR MANAGEMENT (INCLUDING TRAINING OF DIRECT ACTORS IN PROJECT IMPLEMENTATION)

The implementation of specific Activities for Integrated Pest/Vector Management (IPM) within the project is essential to ensure the success of sustainable practices and minimize the environmental and social impacts associated with inadequate management. The proposed actions include technical, training and engagement measures for direct actors involved in the execution of the project.

6.1.1 Empowerment of Direct Stakeholders

The empowerment of the direct stakeholders in the project is essential for the effective implementation of Integrated Pest Management (IPM), promoting sustainable and responsible agricultural practices. In this context, initiatives aimed at technical training and community awareness

are proposed, with the aim of equipping technicians, farmers and local communities with the knowledge and skills necessary for safe and efficient management.

Regular trainings will be held for agricultural technicians, extension workers and farmers, addressing the principles and practices of IPM, including biological control, cultural management and safe use of pesticides. In addition, the training will include the identification and monitoring of pests and diseases, as well as preventive intervention strategies. Practical workshops will be held to demonstrate the safe application of pesticides, the correct use of Personal Protective Equipment (PPE) and the proper management of waste, also ensuring the safe disposal of obsolete packaging and supplies.

To complement the technical training, community awareness programs will be implemented, with the aim of raising awareness among local communities about the risks of indiscriminate pesticide use and the benefits of integrated pest management practices. Accessible communication tools, such as community radios, leaflets, posters and informational videos, will be used to disseminate relevant information in local languages, adapted to the cultural context of the communities.

These capacity building initiatives, combining technical training and awareness campaigns, seek to strengthen knowledge and encourage the adoption of safe and sustainable practices. With a participatory approach, it is expected to achieve effective pest management, contributing to environmental protection, public health, and the agricultural resilience of the communities involved in the project.

6.1.2 Pest/Vector Monitoring and Control

Monitoring and control of pests and vectors are essential components to ensure the sustainability and effectiveness of agricultural practices. The implementation of structured and sustainable strategies increases the resilience of agricultural production, minimizing the environmental and social impacts associated with the use of conventional methods. One of the main recommended actions is the establishment of regional monitoring centers, with the aim of continuously monitoring the population dynamics of pests and vectors in priority agricultural areas, allowing a rapid and effective response to emerging threats. These centers should be equipped with advanced technologies, such as remote sensors and data analysis software, for real-time monitoring. In addition, it is necessary to implement data collection and analysis systems that track the presence, density, and behavior of pests and vectors, enabling the creation of georeferenced risk maps that identify critical areas and guide targeted interventions. Trained technical teams will operate the centers, carry out analyses and propose control measures based on the data collected.

Another key strategy is the use of sustainable control tools and techniques, such as biological control, which involves the use of natural enemies and enteropathogens to reduce pest populations naturally and safely. Additionally, it is important to encourage cultural management, including practices such as crop rotation, adjusting the planting calendar, and using pest- and disease-resistant varieties. These approaches contribute to more balanced and sustainable management, promoting crop health and reducing the need for reliance on chemical pesticides. Together, these strategies strengthen the resilience of agricultural practices, protecting both the environment and the health of farming communities.

6.1.3 Infrastructure Development and Technical Support

Infrastructure development and technical support are key to ensuring the effective implementation of sustainable practices in pest and vector management. One of the priority actions is the provision of appropriate equipment and tools for farmers and technicians. This includes the provision of monitoring traps, biological agents, calibrated spraying equipment, and Personal Protective Equipment (PPE), which are essential to ensure safety and efficiency in pest management. In addition, it is essential to implement adequate systems for the safe disposal of empty containers of pesticides and obsolete pesticides, preventing environmental contamination and risks to human health.

These systems may include recycling programs and specific collection points, accompanied by educational campaigns to raise awareness among farmers about the importance of correct disposal. Together, these initiatives strengthen infrastructure and promote safer and more sustainable agricultural practices, protecting both the environment and the communities involved.

6.1.3 Promotion of Research and Innovation

The promotion of research and innovation is essential for the continuous improvement of integrated pest management (IPM) practices, ensuring their effectiveness and adaptation to local conditions. A priority action in this context is to carry out tests and validation of pest management methods that consider the climatic, cultural and socioeconomic conditions of each agricultural region. This effort includes conducting research to adapt IPM practices to local specificities, as well as testing pest-resistant crop varieties and innovative management methods that are economically viable and accessible to smallholder farmers. These initiatives aim to develop sustainable and customized solutions that reduce dependence on chemical pesticides, increase productivity, and strengthen the resilience of agricultural practices. The integration of research and innovation in the agricultural sector

not only improves food security but also protects the environment and promotes the well-being of rural communities.

6.1.4 Strengthening Governance and Partnerships

Strengthening governance and partnerships is a crucial element for the effective and sustainable implementation of Integrated Pest Management (IPM) actions. A central aspect of this strengthening is the engagement of key actors, including government agencies, NGOs, the private sector and research institutions, promoting a collaborative approach that integrates different perspectives and resources. This strategy allows for a more effective alignment of IPM Activities with local needs, while expanding their scope and impact. In addition, establishing partnerships with international organizations is essential to ensure access to technical, financial, and technological support, strengthening the institutional and operational capacity of pest management initiatives.

6.1.5 Expected Impacts

- **Reducing Environmental and Health Impacts:** More sustainable practices will decrease reliance on chemical pesticides, protecting the environment and public health.
- **Improved Agricultural Productivity:** More effective pest and vector management will contribute to healthier and more productive crops.
- **Strengthening Local Capacities:** Technicians and farmers will be better equipped to address phytosanitary challenges, promoting sustainability in the agricultural sector.

These Activities will ensure an integrated and efficient approach to pest and vector management, aligning with the project's sustainability objectives and the needs of the benefited communities.

6.2 MONITORING, EVALUATION AND COMMUNICATION OF THE IMPLEMENTATION OF THE PEST MANAGEMENT ACTION PLAN (PAGP)

6.2.1 Accompaniment

To measure the effectiveness of the Pest/Vector Management Plan (PMP), it is essential to monitor and evaluate the recommended actions. The monitoring plan will be aligned with the previously planned Activities, being based on the collection and analysis of data to ensure that the implementation of the Activities occurs as expected and to enable immediate adjustments, when necessary.

The monitoring has a short-term evaluation character, allowing real-time actions. The frequency of the Monitoring Activities will be determined by the type of information required, but will be continuous

throughout the implementation of the action plan. The process will be organized through periodic field visits, focusing on assessing the level of implementation of the following Activities of the operational plan:

- Application of good practices in the use and management of pesticides in the project area.
- Use of non-chemical methods of agricultural pest control by producers in production areas.
- Effectiveness of training programs aimed at different actors, including managers and members of agricultural cooperatives.
- Implementation of mitigation methods to minimize the adverse impacts of pesticides on the biophysical and human environment, covering up to the point of packaging.

6.2.2 Evaluation

To achieve the objectives of this plan, a mid-term evaluation will be carried out, which will allow the level of implementation of the action plan to be verified. The results of this evaluation will be shared with technical and financial partners, who will be able to contribute to the improvement of the process.

In addition, a final evaluation will be conducted, which is essential to obtain feedback after the implementation of the plan. This step will consist of measuring the effectiveness and performance of the execution, as well as identifying lessons learned. The results of the final evaluation will be incorporated into the overall evaluation of the project.

6.2.3 Monitoring Indicators

To ensure monitoring, it is essential to define indicators, which function as predetermined signals capable of expressing changes in specific conditions or results associated with the project's interventions. These indicators provide quantitative or qualitative data on the environmental and social impacts and benefits of the project. Monitoring indicators have the following purposes:

- Support the implementation of mitigation measures.
- Enable the continuous monitoring of Activities.
- Facilitate the overall evaluation of the project, allowing the effectiveness of the actions carried out to be verified.

Monitoring indicators for a risk/hazard assessment are key tools for measuring and tracking the factors associated with potential risks or hazards in a project, operation, or process. They make it possible to identify, quantify and monitor conditions that may affect safety, health or the environment, helping to prevent accidents, mitigate negative impacts and promote continuous improvement. In the context of

a management plan, such as the Pest/Vector Management Plan (PMP), risk/hazard assessment is related to the identification and mitigation of possible threats associated with pesticide use, pest control methods, environmental impacts, and human health. Monitoring these risks is carried out based on indicators that provide clear and actionable information to guide decision-making. The indicators for Risk/Hazard Assessment Monitoring are:

6.2.3.1 Health and Environment

These indicators monitor the impacts of pesticides on human health and the environment, considering the aspects below.

- Protective Equipment and Practices
  - Available quantity of personal protective equipment (PPE).
  - Level of knowledge about good management practices (pesticides, empty packaging, etc.).
  - Occupational safety level for people who handle and use pesticides.
  - Percentage of handlers who underwent medical check-ups.
- Environmental Impacts
  - Residue concentration level in non-targets.
  - Impact on domestic animals, aquatic organisms, flora and fauna.
  - Level of toxicity of the decomposed substances.
  - Level of contamination of water resources.
  - Annual epidemiological profile of the intervention municipalities.
  - Physicochemical characteristics of water resources and soils in intervention areas.

6.2.3.2 Storage Conditions/Management of Pesticides and Empty Packaging

Indicators aimed at controlling the management and storage of pesticides and residues:

- Compliance and Storage Practices:
  - Percentage of storage facilities conforming to FAO standards.
  - Percentage of users who follow the correct pesticide storage and use measures.

- Risks and Accidents:
    - Number of products not registered by CILSS used by producers.
    - Number of accidents/poisonings recorded annually due to the transport, storage and use of chemicals.
- Training and Waste Recovery:
    - Percentage of producers trained in spraying techniques.
    - Number of tonnes of empty packaging recovered per year and per district.
    - Existence of waste management systems (pesticides and empty packaging).
    - Quantity of suitable spraying equipment available.
    - Percentage of empty packaging recovered.

6.2.3.2 Staff Training and Population Awareness

Indicators measuring the effectiveness of training and awareness-raising efforts:

- Regulation and Training Tools:
    - Number of updated and disseminated legal texts on the use of pesticides.
    - Number of modules and training guides developed.
    - Number of training sessions held.
    - Number of Information, Education and Communication (IEC) tools created.
- Actor Training and Awareness:
    - Number of actors trained per category.
    - Percentage of the population reached by awareness campaigns.
    - Users' level of knowledge about the products and their risks.
    - Level of knowledge of the traders/distributors about the products sold.
    - Number of producers aware of the harmful effects of pesticides.
- Supervision and Monitoring:
    - Number of supervision operations carried out by plant protection services.

The following is an example of how a summary of the Monitoring Plan could be structured in the form of a table, based on the indicators mentioned. Table 8 can be adapted as needed.

Table 8: Monitoring of the Member's Action Plan Pest Management

COMPONENT	MONITORING ELEMENTS	INDICATORS AND ITEMS TO COLLECT	MEANS OF VERIFICATION	MONITORING FREQUENCY	ACCOUNTABLE
Water and soil	Water quality (surface and groundwater) and soils	Rate of presence of organic chlorine (pesticide residues).	Analysis reports from laboratories and research centers.	Annual	Environmental Specialist at UIP
		Physicochemical characteristics of water resources (surface and groundwater) and soils of valued sites.			
Biodiversity	Number of fauna, flora, fishing resources and livestock not targeted.	Rate of presence of toxic residues in plants, crops, fish and livestock.	Analysis reports of laboratories and research centers;	Semiannually	Environmental Specialist at UIP
		Number of non-target fauna and flora destroyed after phytosanitary treatments.	Environmental monitoring reports and follow-up missions.		
Biophysical and human environments	Living environment (hygiene and sanitation conditions)	Number of products not approved by MINAGRIF, used by farmers.	Analysis reports from laboratories and research centers.	Semiannually	Environmental Specialist at UIP
	Pollution and nuisance.	Percentage of pesticide storage sites in compliance with FAO standards.	Environmental monitoring and follow-up mission reports.		
	Health and safety at work.	Percentage of users who respect the storage and use of pesticides.	Inventory report.		

COMPONENT	MONITORING ELEMENTS	INDICATORS AND ITEMS TO COLLECT	MEANS OF VERIFICATION	MONITORING FREQUENCY	ACCOUNTABLE
		Number of accidents/poisonings recorded, related to pesticides;	Field Control Report		
		Existence of a waste management system (pesticide residues and empty packaging).	Control in health centres.		
		Percentage of users who respect the use of PPE.	Monitoring mission reports and environmental monitoring.		
		Number of producers made aware of the harmful effects of pesticide use.			
		Number of supervision operations carried out by plant protection services.			

6.3 INSTITUTIONAL ARRANGEMENTS (FOCUSING ON THE PROJECT IMPLEMENTING ENTITY, PLANT HEALTH SERVICES OR VECTOR CONTROL) WITH A FOCUS ON THE LOCAL LEVEL (ACTORS AND PARTNERS)

6.3.1 Institutional Provisions

The institutional arrangements of the project are designed to ensure efficient coordination between the different entities responsible for its implementation, with special attention to phytosanitary services, vector control and the participation of actors and partners at the local level.

6.3.1.1 National Level

The main implementing entity will be the Ministry of Agriculture and Forestry (MINAGRIF), which will have the responsibility to lead the implementation of the project in alignment with applicable national and international policies. The structure at the national level has the responsibility to:

- Coordinate project activities in conjunction with other relevant ministries, including those responsible for health, environment and rural development.
- Provide technical and institutional support to the provincial and local levels, especially in strengthening phytosanitary and vector control services.
- Ensure compliance with national and international phytosanitary standards.

The Director General of the Institute for Agricultural Development (ADI) will be responsible for executive management, while the Project Implementation Unit (PIU), led by a Project Coordinator, will take care of operational implementation at the national level.

6.3.1.2 Provincial Level

At the provincial level, implementation will be coordinated by the Institute of Agricultural Development (ADI), in collaboration with the Provincial Directorate of Agriculture and the provincial phytosanitary services. The structure of the provincial level has the responsibility to:

- The Provincial Project Implementation Unit (PPIU) will be responsible for day-to-day management, led by a Provincial Project Coordinator.
- Phytosanitary and vector control activities will be supervised in coordination with local technical services and community partners.
- Coordinate the monitoring of pests and vectors.

- Facilitate compliance with regulations related to pesticide use, transportation, and storage.
- Coordinate the implementation of awareness campaigns on phytosanitary risks and good agricultural practices.

6.3.1.3 Local Level

At the local level, institutional arrangements are structured to promote proximity to the benefited communities, facilitating the implementation of specific pest and vector control actions. The implementation will be led by the Agricultural Development Offices (EDA), which will work together with municipal administrations, local plant health services and community actors. The structure at the local level has the responsibility to:

- Coordinate field activities, including pest and vector monitoring.
- Facilitate compliance with regulations related to pesticide use, transportation, and storage.
- Implement awareness campaigns on phytosanitary risks and good agricultural practices.
- Submit subproject proposals for provincial approval, with adequate technical support.

6.3.1.4 Local Actors and Partners

The latter is responsible for:

- Municipal Administrations: Responsible for supporting the implementation and approving local subprojects.
- Cooperatives and Rural Producers: Directly involved in the application of good practices of integrated pest and vector management.
- NGOs and Service Providers: Assist in the training, monitoring and execution of phytosanitary actions.
- Local Phytosanitary Services: Perform field actions, such as inspections, pest monitoring, and application of control measures.
- Technical and Financial Partners: Such as FAO, which offers specialized technical support and financial resources to strengthen institutional and technical capacities.

6.3.2 Strengthening Local Capacities

Recognizing the administrative and technical constraints at the local levels, the project includes capacity building and technical support strategies, such as:

- Training for EDAs, cooperatives and producers on phytosanitary control and vector management.
- Technical support from experts to ensure the efficiency of local actions.
- Specific tools to measure the effectiveness of interventions and generate regular reports.

These institutional arrangements, integrating national, provincial and local levels, ensure a coordinated and effective approach to pest and vector control, with a focus on sustainability and strengthening institutional and community capacities.

6.4 IMPLEMENTATION COST ESTIMATES

The costs of implementing the Pest Management Plan will depend on the scale and details of the program eventually agreed. So, the estimated cost of around USD 239,000 to implement the PMP over a period of 4 years as detailed in the table below.

Table 9: Budget estimates

ACTIVITY / PROGRAM		DESCRIPTION OF THE BUDGET (USD)				TOTAL
		Year 1	Year 2	Year 3	Year 4	
1	Procurement of pesticides for use in projects	15.000	15.000	10.000	5.000	45.000
2	Purchase of personal protective equipment for project employees, farmers, etc.	10.000	10.000	5.000	5.000	30.000
3	Acquisition of information and communication technology equipment for use in projects	10.000	5.000	5.000	5.000	25.000
4	Surveillance activities targeting pests and vectors	5.000	5.000	5.000	5.000	20.000
5	Purchase of fuels and lubricants for project transport	2.500	2.500	2.500	2.500	10.000
6	Fees for consultations related to the Project Activities	10.000	5.000	5.000	5.000	25.000
7	Orientation workshops on PMP/MPI within the project beneficiary regions	10,000	10,000	10,000	5.000	35,000

ACTIVITY / PROGRAM		DESCRIPTION OF THE BUDGET (USD)				TOTAL
		Year 1	Year 2	Year 3	Year 4	
8	Monitoring, prevention and control, technologies, Capacity building of farmers on the use of agrochemicals and pesticides	4.000	4.000	3.000	3.000	14.000
9	Analysis of water, soil, crop, and livestock samples to verify exposure levels.	1.500	1.500	1.000	1.000	5.000
10	Purchase samples from certified sprayers or applicators to reduce exposure	2.500	2.500	2.500	2.500	10.000
11	Monitoring pesticides in and around project areas	10,000	10,000	5.000	5.000	30.000
TOTAL/USD						**239,000.00**

6.5 COMPLAINT MECHANISM

Grievance mechanisms are an effective way to express concerns and achieve solutions for communities, foster a mutually constructive relationship, and contribute to the achievement of the project's development objectives. Pesticide use poses environmental and public health risks that cannot be ignored and can affect communities if not well managed, resulting in complaints.

Grievance mechanisms serve to prevent conflicts and address community concerns, reduce risk, and influence processes that create positive social change. The complaint filing and resolution mechanism presented in the EIAS will be used for this PMP.

6.6 TRAINING AT NATIONAL LEVEL

Nationwide training for Integrated Pest Management (IPM) is a key element for the effective implementation of the project, aiming to empower institutions and individuals at all levels, promoting sustainable agricultural practices and strengthening phytosanitary management in the country.

6.6.1 Training Objectives

- Develop institutional and human capacities to implement and monitor IPM practices effectively and sustainably.
- To harmonize scientific and traditional knowledge, promoting solutions adapted to local realities.
- Strengthen national phytosanitary services by training technicians and agents to diagnose, monitor and respond to phytosanitary challenges.
- Promote the adoption of IPM practices as part of an integrated sustainable agricultural development strategy.

6.6.2 Training Strategy

The training will be structured to reach multiple levels of actors and will be based on participatory approaches and practical learning. The strategy includes:

- Training of extension workers, phytosanitary agents and community leaders to act as knowledge multipliers.
- Promotion of practical learning in the field, where farmers and technicians work together on experiments and analysis of agroecosystems.
- Approach focused on technical and practical training, focusing on local and replicable solutions.
-

6.6.3 Program Content

The training programmes will include the following core modules:

- Principles of Integrated Pest Management (IPM)
- Agroecosystem Analysis (AESA)
- Pesticide Management and Good Environmental Practices
- Facilitation Techniques and Non-Formal Education
- Strengthening of Phytosanitary Services
- Extension and Awareness.

6.6.4 Actors Involved

The training will be coordinated by MINAGRIF, with support from the Institute for Agricultural Development (ADI) and collaboration with partners such as FAO, NGOs and national phytosanitary services. Key players include:

- Extension workers, phytosanitary agents and TOT instructors.
- Direct beneficiaries of training through FFS.
- NGOs, community leaders, and outreach service representatives.

6.6.5 Expected Results

- Creation of a national network of experts trained in IPM and phytosanitary management.
- Strengthening national institutions to lead and monitor IPM practices.
- Dissemination of sustainable agricultural practices, promoting food security and environmental protection.
- Reducing the inappropriate use of pesticides, minimizing risks to human health and the environment.
- Establishment of more resilient and empowered agricultural communities to respond to phytosanitary challenges.

Training at the national level will provide the necessary basis for the effective implementation of the project, contributing to agricultural sustainability and strengthening food security in Angola.

7. CONCLUSION

The Pest/Vector Management Plan (PMP) plays a key role in addressing the identified deficiencies in the use of pesticides and phytosanitary products in Angola, offering a structured and sustainable response to pest management in the agricultural context. The PMP highlights critical gaps, such as the lack of compliance with current legislation, the limited institutional capacity of phytosanitary services, and the environmental and public health risks associated with the inappropriate use of chemicals.

Given this scenario, the project proposes to strengthen the institutional structure through technical training, revitalization of phytosanitary services and implementation of continuous monitoring systems.

Investing in the training of farmers, agricultural technicians and other actors involved is essential to promote the responsible use of pesticides, reduce negative impacts and encourage integrated pest management practices. The dissemination of knowledge on safe and sustainable practices, including alternative methods such as biological control and cultivation techniques, will contribute to reducing dependence on chemicals.

Environmental monitoring will be a priority and will involve the systematic assessment of the impacts of pesticide use on ecosystems, the quality of soils and water resources, as well as the effects on the health of local populations. This process will be conducted by the Project Implementation Unit (PIU), in collaboration with key institutions such as IDA, the Plant Health Services, the Ministry of Health, private partners and farming communities.

Effective implementation of the PMP will mitigate the risks of environmental degradation, protect biodiversity and prevent adverse impacts on human health caused by the misuse of pesticides. In addition, by promoting safer, more sustainable agricultural practices based on Integrated Pest Management (IPM) principles, the plan will significantly contribute to increasing the productivity of target crops, such as rice, corn, beans, cassava, and vegetables, which are essential for food security and economic development in the country.

Ultimately, the success of the PMP will depend on the continued commitment of local governments, international organizations, the private sector, and most importantly, farmers. The integration of traditional and modern methods, combined with efficient inspection and the strengthening of public policies, will provide a more resilient, sustainable and safe agricultural environment. The implementation of this plan will not only mitigate the current negative impacts, but also create a solid foundation for responsible and innovative agricultural practices, positioning Angola as an example of sustainable pest management and environmental preservation in the region.

8. BIBLIOGRAPHY

- Abrol D.P. and Shanka U. (2012) Integrated Pest Management Principles and Practice. CAB International,
- CCRI (2003) Coffee Guide. Central Coffee Research Institute, India
- Environmental Health Perspectives Volume 113, Number 12, December 2005.
- FAO. Farmer Field Schools: Key Practices for DRR Implementers, 2014.
- FAO. International Code of Conduct on the Distribution and use of Pesticides. Food and Agriculture, Organization of the United Nations, Rome, Italy.2002.
- General Government of Angola. 1965. Regulation of the production, import, internal trade and use of pesticides. Angolan National Press
- GOA, (1992), Constitution of the Republic of Angola
- GOA, (2004) Angolan Land Law, Law 09/04, of 9 November
- GOA, (2004) Law on Spatial Planning and Urbanism, Law 03/04, 25 June 2004
- *GOA, (1998) The Basic Law on the Environment (Law No. 5/98, of 19 June)*
- Ministry of Agriculture, Agriculture Development Institute. Smallholder Agriculture Development And Commercialization Project - Mosap II, Integrated Pest Management Framework.2013.in (http://documents.worldbank.org/curated/pt/914961468009621822/Angola-Smallholder-Agriculture-Development-and-Commercialization-Project-MOSAP-II-integrated-pest-management-framework).
- The United Republic of Tanzania, Agricultural Sector Development Program (ASDP), Integrated Pest Management Plan (IPMP), Revised Version, Brigitte Nyambo-IPM Specialist, March 2009.
- United Nations, 2009. The WHO Recommended Classification of Pesticides by Hazard. Globally Harmonized System of Classification and Labelling of Chemicals (GHS),.
- USAID, Environmental Guidelines for Small-Scale Activities in Africa: Environmentally Sound Design for Planning and Implementing Development Activities, 2007.
- West and Central African Council for Agricultural Research in Africa (WECARD), World Bank West Africa Agricultural Productivity Programme, Pest and Pesticide Management Plan Report, Dr Djibril Doucouré, ddouc60@yahoo.com; ddouc@refer.sn, January 2007
- World Bank. Environmental and Social Framework in particular, ESF1, ESF3 and ESF4.
- World Bank, Pest Management Guidebook, 357p, 2006.
- World Bank. Safeguard policies in particular OP 4.09 and BP 4.01. The World Bank Group (WBG) Environmental, Health, and Safety (EHS) Guidelines, 2014
- The World Bank Group (WBG). Environmental, Health, and Safety (EHS) Guidelines,.2014.
- https: pesticidestewardship.or

ATTACHMENTS

ANNEX I - PESTICIDES USED IN ANGOLA

ANNEX II - LIST OF THE MAIN WEEDS IN ANGOLA

ANNEX III - GUIDELINES FOR PESTICIDE HANDLING, EPP USE AND DISPOSAL OF EMPTY PESTICIDE CONTAINERS

ANNEX IV – PESTICIDE STORAGE CHECKLIST

ANNEX V - LIST OF KEY ACTORS CONSULTED DURING THE DEVELOPMENT OF THE PMP

ANNEX I - PESTICIDES USED IN ANGOLA

CHEMICAL TRADE NAME	ACTIVE SUBSTANCE	TOXOLOGICAL CLASS ACCORDING TO WHO	REGISTRATION NUMBER	REPRESENTATIVE
Sevin 5pp	Carbaryl	II	IN 001	Agran
Mortein Target Actellic	Pyrifos Methyl+ Permethrin	II	IN 002	Syngenta
Soleol M	Summer oil		IN 003	Agran
Sevin 85 wp	Carbaryl	II	IN 004	Agran
Agror 40 cpe	Dimethoate	II	IN 005	Agran
Demand 2.5 cs	Lambda Cyhalothrin	II	IN 006	Syngenta
Malaton 50 s	Malathion	III	IN 007	Agran
Icon 2.5 cs	Lambda-Cyhalotrin	II	IN 008	Syngenta
Selecron 500 ec	Profenofos 500	II	IN 009	Syngenta
Duduthrin 5 % Ec	Lambda cyalotrina	II	IN 013	Goldenagric
Delta	Deltamethrin 25 g/l	II	IN 014	Sapec
Malathion 5 p	Malathion	III	IN 015	Agran
Twigathoate 40% Ec	Dimethoate	II	IN 016	Goldenagric
Twigaphos 48% Ec	Chlorpyrifos	II	IN 017	Goldenagric
Super Guard Dust	Permethrin + pyrimiphos-methyl	II	IN 018	Agran – Avima
Deltagran 2.5 ec	Deltamethrin	II	IN 019	Agran
Larvin 37.5 % sc	Thiodicarb 375 g/l	II	IN 021	Bayer
Sumigran 50	Fenitrothion	II	IN 022	Agran
Twigacyper 55 Ec	Cypermethrin 50 g/lt	II	IN 025	Goldenagric
Dynamec 018 ec	Abamectin 18 g/l	II	IN 027	Syngenta
Alpha-ZiEPPr	Alpha-cypermethrin 10%	II	IN 028	Sapec
Confidor 35 sc	Imidacloprid 350 g/l	II	IN 030	Bayer
Confidor 20% sl	Imidacloprid 200 g/l	II	IN 031	Bayer
Actellic 50 ec	500 g/l Pyrifos Methyl	II	IN 032	Syngenta
Pacha	15g/l Lambda- Cyhalothrin + 20g/l Acetamiprid	II	IN 033	Syrius
ZiEPPr	Cypermethrin 100g/l	II	IN 034	Sapec
Furanpri	Chlorpyrifos 50 g/kg	II	IN 035	DVA-Agro
Confidor 70 wg	Imidacloprid 700 g/kg	II	IN 037	Bayer
Pirate	Imidacloprid 18g/l or 17.8%(w/w)	II	IN 039	Sapec
Cyclone 48 ec	Chlorpyrinfos 48g/l or 48.4%(w/w)	II	IN 040	Sapec
Leni 50 ec	Deltamethrin 50 g/l	II	IN 041	Stork
Cigogne c	Cypermethrin 50g/l + Chlorpyrinfos 500 g/l	II	IN 043	Stork
Go-kart	Kartap 500 g/l	II	IN 044	Stork
Acamat	Abamectin 18 g/l	II	IN 045	Stork
Montaz	250g/kg Imidacloprid + 200g/kg Thiram	II	IN 048	Sirius
Cipclorius	Cypermethrin 50g/l+Chlorpyrinfos 500 g/l	II	IN 049	Syrius

CHEMICAL TRADE NAME	ACTIVE SUBSTANCE	TOXOLOGICAL CLASS ACCORDING TO WHO	REGISTRATION NUMBER	REPRESENTATIVE
Malation ulv	Malathion	III	IN 050	Agran
Desirius	Deltamethrin 25 g/l	II	IN 051	Sirius
Antuka	3g/kg Permetrin + 16g /kg Pirimiphos methyl	II	IN 052	Stork
Insector	Imidacloprid + Thirame	II	IN 053	Stork
Fiprorius 0.3 G	Fipronil 0.3%	II	IN 054	Sirius
Fiprorius 50 sc	Fipronil 50 g/l	II	IN 055	Sirius
Indorius	Indoxacarb 155%	II	IN 057	Sirius
Biorius	*Bacillus turgiensis* var. kurstakit	III	IN 058	Sirius
Pin 80	Fipronil 800 g/kg	II	IN 059	Stork
Dimetec	Dimethoate 400 g/l	II	IN 061	Sapec
Fitanol	Summer oil		IN 062	Sapec
Judo Forte	Lambda-Cyhalothrin 15 g/l + Profenophos 15 g/l	II	IN 063	Sapec
Malaton 5p	Malathion	II	IN 066	Sapec
Pony	Acephate 75%	II	IN 068	Sapec
Fastac 100 ec	Alpha Cypermethrin 100 g/l	II	IN 069	Basf Agromundo
ZiEPPr 200	Cypermethrin 200 g/l	II	IN 070	Sapec
Strong Deciles 10% EC	Deltamethrin 100 g/l	II	IN 072	Bayer
Acamat Super	Pyridaben 150 g/l	II	IN 073	Stork
Boreal	Abamectin 18 g/l	II	IN 075	Sapec
Regentway 20% sc	Fipronil	II	IN 076	Agroway
Acarius	Abamectin 18 g/l	II	IN 078	Syrius
Actellic 50 ec	Methyl Pyrifos	II	IN 080	Agran
Insecticide 5 Ec	Lambda cyhalothrin 50 g/l	II	IN 082	DVA Agro GmbH
Actellic 1 p	Methyl Pyrifos	II	IN 084	Agran
Binferius	Binfetrin 100 g/l	II	IN 085	Sirius
Karate 5 ec	Lambda- Cyalotrina	II	IN 086	Syngenta
K-othrine wg 250	Deltamentrin 250 g/kg	II	IN 087	Sheba (Bayer)
Matacarius	Hexitiavirus 50 g/l	U	IN 088	Sirius
Cyperin	Cypermethrin 200g/l	II	IN 089	Agrom) Plaskem
Bastion 3 G	Imidacloprid 30 g/kg	II	IN 092	Stork
Sevin 25 ulv	Carbaryl	II	IN 094	Agran
Sumigran ulv	Fenitrothion	II	IN 096	Agran
Fix 50 Ec	Fipronil 50 g/L Ec	II	IN 097	Stork
Moran 150 Ec	Indoxacarb 150 g/l Ec	II	IN 098	Stork
Ferticlopride	Imidacloprid 200g/l	II	IN 101	Fertiangola
Fertiphos	Chlorpyrifos 480g/l	II	IN 102	Fertiangola
Fertimectin	Abamectin	II	IN 103	Fertiangola
Ferticiper	Cypermethrin 100g/l	II	IN 104	Fertiangola
Abamate	Abamectin 18g/l	II	IN 105	Taurus
Judo	Lambda cyhalothrin 100g/l	II	IN 106	Sapec
Falathion 570 Ec	Malation 600g/l	III	IN 107	Fertisem
Lalothrin 5% Ec	Lambda cyhalotrin	II	IN 111	Globalway
First 35%Sc	Imidacloprid	II	IN 112	Globalway

CHEMICAL TRADE NAME	ACTIVE SUBSTANCE	TOXOLOGICAL CLASS ACCORDING TO WHO	REGISTRATION NUMBER	REPRESENTATIVE
Regentway 80% WDG	Fipronil	II	IN 113	Globalway
Karapri EC	Lambda cyhalotrin 50 g/l	II	IN 114	DVA – AGRO
Thermidor 25	Fipronil 25 g/lt	II	IN 115	Agromundo-BASF
Deltapri	Deltamethrin 25 g/lt	II	IN 116	DVA Agro
Fertialfa	Alpha-Cypermethrin 100g/l Ec	II	IN 117	Fertiangola
Fertidelta	Deltamethrin 50g/l Sc	II	IN 119	Fertiangola
Fertiphenil	Dimethoate 400g/l Ec	II	IN 120	Fertiangola
Fertikare	Lambda-cyhalotrin 100g/l Ec	II	IN 121	Fertiangola
Fertithio	Endosulfan 350 g/l Ec	II	IN 122	Fertiangola
Cesarina	Cyromazine 100 g/lt	III	IN 123	Louis Dreyfus
Epicure 0.4%	Abamectin 4g/l 97%	II	IN 125	Agromundo-Nulandis
Regent	Fipronil 80g/kg	II	IN 126	Agromundo
Lambada	Lambda-cyhalotrin 50g/l	II	IN 128	Taurus
Abamec	Abamectin	II	IN 129	Globalway
DiPel Df	*Bacillus thurgiensis* subs israelensis	III	IN 131	Agromundo(sumitomo)
Delta	Deltamethrin	II	IN 133	Globalway
Mectin 1.8% EC	Abamectin 18 g/l	II	IN 134	Agromundo Nulandis
Fertipronil	Fipronil 200g/l	II	IN 135	Fertiangola
Dafipri	Dimethoate 40%	II	IN 136	DVA Agro
Lagapri	Indoxacarb 15%	II	IN 137	DVA Agro
Kohinor 350 SC	Imidacloprid	II	IN 138	Dispec
Lamdex 5 Ec	Lambda-cyhalotrin 50g/l	II	IN 139	Dispec
Aceta Star 46 Ec	Acetamiprid 16 g/l + Bifenthrin 30 g/l	II	IN 141	Dispec
Servus 25 Ec	Deltamethrin 25 g/l	III	IN 142	Dispec
Karapri	Lambda cyhalotrin 50g/l	II	IN 143	DVA Agro
Deltapri	Deltamethrin 25 g/l	IV	IN 144	DVA Agro

Source: WHO Classification of Recommended Pesticides according to hazard, 2009ANNEX II – LIST OF MAJOR WEEDS IN ANGOLA

ANNEX II – LIST OF THE MAIN WEEDS IN ANGOLA

FAMILY NAME	SCIENTIFIC NAME	CLASSIFIER
Acanthaceae	*Pteridophyta*	
	Justice sp	
	Dicotyledoneae	
Amaranthaceae	*Amaranthus hibridus*	L.
Asteraceae	*Acanthospermum xanthioides*	Anno Domini.
Asteraceae	*Ageratum conyzoides*	L.
Asteraceae	*Bidens biternata*	(Lour.)Merr.&Scherff
Asteraceae	*Bidens pilosa*	L.
Asteraceae	*Bidens steppia*	(Steetz) Sherff
Asteraceae	*Blumea lacera*	(Burm.f) DC
Asteraceae	*Crassocephalum rubens*	(Juss. Ex Jacq.) S. Moore
Asteraceae	*Crassocephalum sarcobasis*	(DC) S. Moore
Asteraceae	*Conyza stricta*	Wild
Asteraceae	*Emilia coccinea*	(Sims) G. Dan
Asteraceae	*Feliaia muricata*	Thunb.
Asteraceae	*Galinsoga parviflora*	Cav.
Asteraceae	*Pseudognaphalim luteo-album*	(L.)
Asteraceae	*Tagete minuta*	L.
Asteraceae	*Vernonia petersii*	Oliv. & Hiern
Asteraceae	*Vernonia poskeana*	Vatke & Hildebrandt
Capparaceae	*Cleome iberidella*	Welw.
Capparaceae	*Cleome monophylla*	L.
Chenopodiaceae	*Chenopodium ambrosioides*	L.
Convolvulaceae	*Ipomea eriocarpa*	R. Br.
Curcubitaceae	*Zehneria racemosa*	Hook.f
Fabaceae	*Caesalpina sp.*	
Fabaceae	*Chamaecrista mimisoides*	L.
Fabaceae	*Crotolaria aculeata*	Wild
Fabaceae	*Crotolaria anthyllopsis*	Welw.
Fabaceae	*Crotolaria comosa*	Baker
Fabaceae	*Indigastrum costatum*	(Guill. & Perr.)
Fabaceae	*Indigofera subulifera*	Welw.
Fabaceae	*Sesbania pachycarpa*	Anno Domini.
Fabaceae	*Tephrosia melanocalix*	Welw.
Fabaceae	*Vigna sp.*	
Lamiaceae	*Leucas martinicensis*	(Jacq.) R. Br.
Malvaceae	*Hibiscus canabinus*	L.
Malvaceae	*Sida cardifolia*	L.
Meniospermaceae	*Cissampelos mucronata*	A. Rich
Oxalidaceae	*Oxalis semiloba*	

FAMILY NAME	SCIENTIFIC NAME	CLASSIFIER
Portulaceae	*Portulaca oleraceae*	L.
Rubiaceae	*Calanda rubricaulis*	K. Schum
Rubiaceae	*Oldenlandia herbácea*	(L.) Roxb.
Rubiaceae	*Richardia scabra*	L.
Scrophulariaceae	*Alectra sessiliflora*	(vahl) Kuntze
Solanaceae	*Datura stramonium*	L.
Solanaceae	*Nicandra physoloides*	(L.)Gaertn
Tiliaceae	*Corchorus tridens*	L.
Tiliaceae	*Lasiosiphon sp*	
Tiliaceae	*Triumfetta annua*	L.
Verbenaceae	*Lipia sp*	
Commelinaceae	*Commelina benghalensis*	L.
Commelinaceae	*Commelina purpurea*	C.B. Clarke
Cyperaceae	*Abilgaardia hispidula*	(Vahl) Lye
Cyperaceae	*Cyperus distans*	L.
Cyperaceae	*Cyperus esculentus*	L.
Cyperaceae	*Cyperus rotundus*	L.
Cyperaceae	*Killinga Odorata*	Vahal
Cyperaceae	*Mariscus alternifolius*	Vahal
Cyperaceae	*Mariscus umbellatus*	Vahal
Cyperaceae	*Mariscus cylindristachyus*	Steud
Poaceae	*Cynodon dactylon*	(L.) Pers.
Poaceae	*Digitaria spp*	
Poaceae	*Eleisine indica*	Gaertum
Poaceae	*Eragrotis annualata*	Rendle
Poaceae	*Eragrostis chapelieri*	Ness
Poaceae	*Eragrotis superba*	Peyr
Poaceae	*Hyparrhenia rufa*	(Nees) Stapf
Poaceae	*Melinis repens*	(Willd.)Zizka
Poaceae	*Setaria sphacelata*	(Shumach.) Moss
Poaceae	*Sporobolus pyramidalis*	Beuv

ANNEX III - GUIDELINES FOR PESTICIDE HANDLING, EPP USE AND DISPOSAL OF EMPTY PESTICIDE CONTAINERS

A. GUIDELINES FOR SAFE USE AND HANDLING OF PESTICIDES

The use of pesticides safely depends on many factors. Some of the most important factors include selecting the appropriate product and using that product according to the label instructions. The label instructions are written to minimize risks to users, the environment, fauna and to define the legal limits of use of a particular product. The following guidelines can be used for safe use and handling of pesticides:

- Make sure that children, pets and anyone who is not essential to the application is out of the area before mixing and applying the pesticides.
- Wear protective clothing before starting to handle any pesticide. Wear a long-sleeved shirt, closed-toe pants and boots, and any other protective clothing or protective equipment required by the label.
- Mix pesticides outside or in well-ventilated areas.
- Mix only what you need to use on a short-term basis to avoid storing or discarding excess pesticide.
- Be prepared to contain any pesticide spills. Have paper towels, sawdust, garbage bags, and non-absorbent gloves on hand to contain the spill.
- Avoid using excessive amounts of water, as this can only spread the pesticide and can be harmful to the environment.
- Read the first aid instructions on the label before using the product.
- Remove personal items such as toys, clothing, or tools from the area to be sprayed to avoid contamination.
- When spraying pesticides indoors, make sure the area is well ventilated.
- When applying pesticides like spray or dust to the exterior, close the doors and windows in your home.
- After using pesticides, wash your hands thoroughly before smoking or eating.

B. GUIDELINES FOR THE DISPOSAL OF EMPTY PESTICIDE CONTAINERS

The disposal of empty pesticide containers after their use and especially with pesticide residues must be in accordance with the provisions of Angolan law. In this case, it is recommended to destroy these containers.

For the effective elimination of these empty containers, at the very least, it is necessary to:

- The agrarian and accredited professional must wash empty containers right after emptying and rinsing them manually or using specific washing pressure machines. After this process, the washing water must be emptied into the spray tank
- There must be specific structures for the specific collection of these containers. Typically, empty containers are deposited in collection basins, which should be located as close as possible to the pesticide use sites where they are emptied.
- Ensure that companies licensed for this type of service do the collection work on time and on a regular basis to ensure recycling for certain packaging and/or destruction.
- In case of recycling, care must be taken for the permitted use of recycled material, in order to avoid risks to public health.

C. PERSONAL PROTECTIVE EQUIPMENT (PPE) USE GUIDELINE

PPE (Personal Protective Equipment) is defined as "all equipment (including clothing that protects from the weather) that must be worn by a person for protection against one or more health or safety hazards in the workplace." PPE is an important and necessary element to ensure safety in the program. Therefore, it is essential to ensure that everyone associated with the program has adequate PPE for the job.

For PPE to be effective as a control measure, the program must ensure the following elements: i) Selection of personal protective equipment, ii) Issuance of personal protective equipment and fit testing iii) Information, instructions and training iv) Proper use and supervision v) Inspection, storage, availability and maintenance vi) Disposal, record keeping vii) Review of the program and viii) Responsibilities of workers. PPE are listed below:

- **Gloves**: Avoids direct exposure of the hands (especially the fingers) to the wrist while handling insecticides, especially when operators are preparing the aqueous solution and during spraying. They can also be used during loading/unloading and disposal of leftovers and empty containers.

- **Face mask:** Avoids direct exposure through inhalation of insecticides. It is typically used by personnel involved in loading/unloading, preparation of aqueous solution, and spraying (sprayer only).
- **Aprom**: prevents direct exposure of the body to insecticides.
- **Shoes**: Wearing covered shoes protects your feet from being exposed to insecticides. They should be used during the spraying operation.
- **Goggles** : the goggles reduce the risk of operator exposure to spray droplets, during applications, especially in the field.
- **Helmet**: A helmet is useful for protecting the operator's head, neck, and face from spray droplets.

ANNEX IV – PESTICIDE STORAGE CHECKLIST

INSPECTION DATE:						
SAFETY	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Locked warehouse						
Signposted storage area, including emergency contacts.						
Signs about smoking prohibition.						
Personal protective equipment stored nearby.						
Cleaning/emergency supplies stored nearby.						
The inventory is updated and stored separately.						
Tags and MSDS in the file						
Fire extinguisher in good working order						
STORAGE AREA	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
The ventilation system is working.						
The area is cleaned with no residue or combustible.						
The floor has no spills or leaks.						
Pesticides stored off the ground						
The storage area contains only pesticides - no food, fertilizer or other materials.						
CONTAINER INSPECTION	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Legible labels attached to containers/packages						
Containers marked with date of purchase.						
Dry formulations stored above containers of liquids.						
The lids of the containers are tightly closed.						
The used containers are rinsed and pierced.						

Adapted from Pesticides stewardship.org

ANNEX V – LIST OF KEY ACTORS CONSULTED DURING THE DEVELOPMENT OF THE PMP

INSTITUTION	PERSON AND CONTACT	FUNCTION/ROLE IN THE ORGANIZATION	CONTACT PERSON	DATE OF THE MEETING

ANNEX VI: PMP ANNUAL REPORT TEMPLATE

RELEVANT AUTHORITY:	
REPORTING DATES:	
PROVINCE/MUNICIPALITY/COMMUNITY:	
NAME OF THE SUB-PROJECT:	

Subproject title	**Identified cases**	**Location (coordinates)**	**Size of the affected area**	**Treatment stage**	**Level of treatment success**	Type of pesticide used	**Problems**
(Name, location, title, or reference)	(new, recidivism)	See note below		Yes, No or N/A	Good, bad or needs improvement A		
1							
2							
3							
And so on							

ORGANIZED TRAINING	**ADDITIONAL TRAINING REQUIRED**	**TRAINING SCHEDULE**	**OBSERVATIONS**
1			
2			
and so on			