



DRAFT REPORT

PEST MANAGEMENT PLAN (PMP)

FOR THE PROPOSED

AGRICULTURAL TRANSFORMATION CENTERS (ATC)

AT

- Technology Park, Ijebu-Ife town, Ijebu East Local Government Area,
- Sawonjo Farm Settlement, Sawonjo, Yewa North Local Government Area and Four (4) Connecting Roads (32km in total).

BY

Ogun State Special Agro-Industrial Processing Zones (SAPZ)
Ogun State, Nigeria

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ABBREVIATIONS & ACRONYMS

Acronym	Full Meaning
AfDB	African Development Bank
ATC	Agricultural Transformation Center
CABI	Centre for Agriculture and Bioscience International
CAPA	Corrective and Preventive Action
CRIN	Cocoa Research Institute of Nigeria
CXS 193-1995	Codex Alimentarius “General Standard for Contaminants and Toxins in Food and Feed”
DE	Diatomaceous Earth
E&S	Environmental and Social
ECOWAS	Economic Community of West African States
EHS	Environmental, Health and Safety (Guidelines)
ESF	Environmental and Social Framework (World Bank)
ESS3	Environmental and Social Standard 3
FAO	Food and Agriculture Organization of the United Nations
FEFO	First-Expired, First-Out
FIFO	First-In, First-Out
GHS	Globally Harmonized System of Classification and Labelling of Chemicals
GIIP	Good International Industry Practice
GRM	Grievance Redress Mechanism
HHP	Highly Hazardous Pesticide(s)
ICCO	International Cocoa Organization
INPhO	(FAO) Information Network on Post-harvest Operations
IPM	Integrated Pest Management
IRRI	International Rice Research Institute
ISS	Integrated Safeguards System (AfDB)
KLD	Kiloliters Per Day
KPI(s)	Key Performance Indicator(s)
LGB	Larger Grain Borer (<i>Prostephanus truncatus</i>)
MC	Moisture Content
NAERLS	National Agricultural Extension and Research Liaison Services
NAFDAC	National Agency for Food and Drug Administration and Control (Nigeria)

NESREA	National Environmental Standards and Regulations Enforcement Agency
NIFOR	Nigerian Institute for Oil Palm Research
NIOSH	National Institute for Occupational Safety and Health (US)
NRCRI	National Root Crops Research Institute
OGADEP	Ogun State Agricultural Development Programme
OGEPA	Ogun State Environmental Protection Agency
OGSAPZ	Ogun State Agro-Industrial Processing Zone
OHS	Occupational Health and Safety
OP 4.09	Operational Policy 4.09: Pest Management (World Bank)
OS-1/OS-3/OS-4/OS-5	Operational Safeguards 1/3/4/5 (AfDB ISS)
OSHA	Occupational Safety and Health Administration (US)
P&I (UK P&I Club)	United Kingdom Protection and Indemnity Club
PICS	Purdue Improved Crop Storage
PMP	Pest Management Plan
PMU	Project Management Unit
PPE	Personal Protective Equipment
QC	Quality Control
RH	Relative Humidity
SAPZ	Special Agro-Industrial Processing Zone
SCBA	Self-Contained Breathing Apparatus
SDS	Safety Data Sheet
SON	Standards Organization of Nigeria
STEL	Short-Term Exposure Limit
STP	Sewage Treatment Plant
TWA	Time-Weighted Average
WB (WBG)	World Bank (World Bank Group)
WHO	World Health Organization

EXECUTIVE SUMMARY

ES 1: Introduction

The Agricultural Transformation Centre (ATC) under the Ogun State Special Agro-Industrial Processing Zone (SAPZ) is a strategically planned facility designed to support agricultural production, aggregation, storage, and agro-processing across priority value chains. The scale and intensity of crop production, storage, and processing activities within the ATC and its out-grower catchments present heightened risks of pest infestation and inappropriate pesticide use, which may undermine agricultural productivity, food safety, environmental quality, and public health if not properly managed.

To address these risks, a Pest Management Plan (PMP) has been prepared to guide sustainable, safe, and effective pest management throughout the ATC's lifecycle—covering pre-construction, construction, operational, and eventual decommissioning phases. The PMP is aligned with the African Development Bank (AfDB) Integrated Safeguards System (ISS, 2023), the World Bank Environmental and Social Standard 3 (ESS3), and the FAO Integrated Pest Management (IPM) principles. It prioritizes pest prevention, ecosystem-based solutions, and reduced dependence on chemical pesticides, while ensuring practicality and scalability for Ogun State's agro-ecological context.

The key objectives of the PMP include:

- Phasing out Highly Hazardous Pesticides (HHPs) and Persistent Organic Pollutants (POPs);
- Promoting widespread adoption of Integrated Pest Management (IPM) across ATC-linked farmers and processors;
- Establishing a multi-method pest surveillance and early-warning system;
- Strengthening farmer, extension, and institutional capacity on IPM and pesticide safety;
- Reducing pesticide-related health incidents and environmental contamination;
- Institutionalizing coordinated pest management governance within the SAPZ framework.

The PMP responds to the reality that unmanaged pests and unsafe pesticide practices can result in yield losses, contamination of soil and water resources, biodiversity decline, occupational exposure, and loss of market access. It therefore provides a structured, science-based, and socially inclusive approach to pest management that safeguards productivity while protecting human health and the environment.

The Pest Management Plan (PMP) was prepared through a systematic process involving desktop review of relevant national regulations, international good practice guidelines, baseline environmental and agricultural data, and stakeholder consultations with farmers, agricultural extension officers, project beneficiaries, and relevant government institutions such as Ogun state Ministry of Agriculture, Ogun State ministry of Environment, OGADEP. Field assessments were also undertaken to identify prevailing pest management practices, potential risks associated with pesticide use, and opportunities for promoting Integrated Pest Management (IPM) approaches. The findings from these activities informed the development of mitigation measures, monitoring mechanisms, implementation arrangements, and budget provisions outlined in this PMP.

ES 2: Project Description

The Ogun SAPZ Agricultural Transformation Centre (ATC) forms a core component of the broader SAPZ programme designed to integrate agricultural production, aggregation, processing, and market access. The ATC is intended to support priority commodities including Cassava, Rice, Timber, Oil palm (where applicable in the catchment), Cocoa, and other staple and cash crops produced within its zone of influence.

Planned infrastructure includes processing facilities, storage warehouses, cold storage units, quality control laboratories, waste management systems, offices, training centres, and supporting utilities such as internal roads, drainage, water supply, electricity, and sanitation facilities. The ATC is designed with climate-resilient and environmentally responsible features, including controlled pesticide storage areas, waste handling facilities, and designated zones for agro-input management.

By centralizing services and infrastructure, the ATC addresses persistent challenges of low productivity, high post-harvest losses, fragmented value chains, limited extension

reach, and weak quality assurance. The development and operation of the ATC will support agricultural production, aggregation, processing, storage, and value addition activities, which may increase pest and disease risks through intensified farming practices, crop concentration, and storage of agricultural produce. These activities trigger the need for Integrated Pest Management (IPM) to ensure that pest control measures are applied in a safe, sustainable, and environmentally responsible manner throughout the agricultural value chain. Expected benefits include job creation, income growth, reduced losses, improved food safety, strengthened market competitiveness, and enhanced public and private investment confidence. Project option assessment considered: (i) the no-project scenario, which would perpetuate pest-related losses and unsafe practices; (ii) delayed implementation, which would prolong vulnerability; and (iii) immediate implementation with structured pest management. Integrated Pest Management (IPM) was adopted as the preferred approach because it provides a balanced and sustainable framework for pest control by combining biological, cultural, mechanical, and limited chemical measures in a manner that minimizes environmental and health risks. Compared to exclusive reliance on chemical control, IPM reduces pesticide dependency, lowers the risk of pest resistance, and mitigates adverse effects on human health and non-target species. In contrast to purely biological methods, IPM offers greater flexibility and effectiveness in managing diverse pest challenges under varying field conditions. Immediate implementation supported by a robust PMP and guided by IPM principles was therefore identified as the most beneficial and sustainable option.

ES 3: Institutional Arrangements and Responsibilities

Effective implementation of the PMP relies on coordinated institutional arrangements across state ministries, extension systems, research institutions, and SAPZ governance structures. The PMP is consistent with AfDB ISS (2023), World Bank ESS3, FAO IPM guidelines, NAFDAC pesticide regulations, and NESREA environmental standards. It also aligns with Nigeria's national plant protection and quarantine framework, including the role of the National Agricultural Quarantine Service (NAQS) in regulating the importation, exportation, and monitoring of plant materials and agricultural inputs to prevent the introduction and spread of pests and diseases.

Institutional responsibilities include:

- Ogun State Ministry of Agriculture and Food Security: overall technical leadership, IPM policy guidance, and coordination of pest surveillance and extension services.
- Ogun State Ministry of Environment: environmental safeguards oversight, pesticide residue monitoring, and waste management compliance.
- State Agricultural Development Programme (ADP): farmer training, field surveillance, extension delivery, and community engagement.
- SAPZ Steering Committee: multi-stakeholder coordination, policy oversight, and reporting to development partners.
- Research institutions and development partners: technical backstopping, innovation, and capacity support.

Farmer Field Schools (FFS), Training-of-Trainers (ToT), and community IPM campaigns strengthen capacity at farm level, with deliberate inclusion of women and youth. A centralized PMP reporting and monitoring system supports coordination, accountability, and adaptive management.

ES 4: Pest Assessment and Surveillance

The PMP establishes an integrated pest assessment and surveillance system combining field-based scouting, trap-based monitoring, farmer reporting, laboratory diagnostics, and geospatial tools. Target crops—such as rice, cocoa, cassava, timber, and other ATC-linked commodities—are subject to a range of pests including stem borers, fall armyworm, mites, beetles, mealybugs, nematodes, and storage pests.

Current Pest Management Practices in Nigeria

In Nigeria's agricultural sector, pest management is predominantly characterized by a combination of conventional chemical control and emerging integrated approaches. Farmers commonly rely on synthetic pesticides due to their rapid effectiveness and accessibility, often with limited adherence to recommended application practices. However, there is a growing shift toward Integrated Pest Management (IPM), promoted by extension services, research institutions, and development programs. These approaches include cultural practices (crop rotation, intercropping), biological control methods, resistant crop varieties, and improved pest surveillance systems. Regulatory

oversight is provided by national agencies responsible for pesticide registration, environmental compliance, and quarantine control.

Crop-Pest Risk Linkages

Crop	Key Pest Risks
Rice	Stem borers, rice blast vectors, leaf folders
Cassava	Mealybugs, cassava mosaic vectors, green mites
Cocoa	Capsids (mirids), cocoa pod borers, mealybugs
Timber	Termites, borers, defoliators
Maize	Fall armyworm, stem borers, storage weevils
Vegetables	Aphids, whiteflies, mites, leaf miners

Surveillance Approaches include:

- Routine field inspections and economic threshold-based scouting;
- Use of pheromone, sticky, light, and pitfall traps;
- Community-based reporting through trained farmers and youth scouts;
- Laboratory confirmation where required;
- Supplementary GIS and remote sensing tools for hotspot mapping and trend analysis.

The surveillance system operates across all project phases, ensuring early detection, data-driven decision-making, and targeted interventions that minimize unnecessary pesticide use while aligning with national and international best practices.

ES 5: Existing Controls and Nature-Based Solutions

Existing pest control practices include cultural measures, limited use of botanicals, and NAFDAC-approved pesticides, often applied without systematic monitoring. The PMP strengthens these practices through structured IPM, emphasizing nature-based solutions such as biological control agents, botanical pesticides, habitat management, resistant varieties, crop rotation, and soil health improvement.

Nature-based solutions reduce chemical dependency, protect beneficial organisms, lower costs, and enhance ecosystem resilience. These approaches are embedded within an IPM framework to ensure effectiveness, scalability, and compliance with safeguard requirements.

ES 6: Phytopharmaceutical and Agricultural Extension Capacity

The PMP addresses gaps in phytopharmaceutical services and extension capacity by strengthening regulatory oversight, residue monitoring, pesticide storage and distribution systems, and farmer education. Extension services are upgraded through IPM-focused training, FFS, ToT programmes, youth IPM scouts, and ICT-enabled reporting and advisory systems.

This integrated capacity-building approach ensures safer pesticide supply chains, improved IPM adoption, and reduced health and environmental risks.

ES 7: Integrated Pest Management Strategies

The PMP applies a tiered IPM approach prioritizing preventive cultural practices, mechanical and physical controls, biological and botanical solutions, and limited chemical use as a last resort. Only NAFDAC-approved, low-toxicity pesticides are permitted, with strict exclusion of HHPs and POPs.

Economic Threshold Levels guide interventions, supported by routine scouting, digital reporting, and post-intervention monitoring. Storage pest control, moisture management, hermetic storage, and mycotoxin prevention are integral components.

ES 8: Productivity and Sustainability Benefits

Three pest management options were assessed: exclusive biological control, integrated IPM, and exclusive chemical control. The analysis demonstrated that integrated IPM offers the best balance between productivity, environmental protection, health safety, cost-effectiveness, and institutional alignment. Exclusive chemical reliance was found to be unsustainable and high-risk.

ES 9: Health, Environmental and Safety Considerations

The PMP integrates strong health, safety, and environmental safeguards, including mandatory training, PPE use, buffer zones, safe storage, residue monitoring, emergency response procedures, and regulated disposal of pesticide containers. These measures protect workers, communities, ecosystems, and food safety.

ES 10: Stakeholder Engagement and Awareness

Stakeholder consultations for the Ogun SAPZ ATC PMP were conducted between 19 November and 4 December 2025 across key locations in Ogun State, including Ijebu Mushin and Iwaya (for the Ijebu Itele and Imasayi–Sawonjo axis). Meetings were held at venues such as the Ijebu Mushin Palace Hall, Iwaya community (including the palace of Ogbadagbada), farmers’ houses, and within farmlands in the respective project areas to ensure direct engagement with project-affected communities.

Key sessions included an initial sensitization meeting on 22 November 2025 with Local Government representatives, farmers’ cooperatives, and community leaders, and a stakeholder scoping workshop on 24 November 2025 at the Ijebu Mushin Palace Hall.

The consultations covered a wide range of stakeholders, including smallholder farmers, women and youth groups, agro-dealers, extension officers, and community leaders. Relevant government institutions consulted included the Ministry of Agriculture, Ministry of Environment, and Ministry of Lands, as well as OGADEP and the Ogun SAPZ Project Implementation Unit (PIU). These consultations ensured that local knowledge, technical inputs, and regulatory perspectives were adequately incorporated into the PMP.

ES 11: Budgeting and Financing

The estimated budget for implementation of the Pest Management Plan (PMP) has been developed to cover all key implementation components, including surveillance infrastructure, training and capacity building, procurement of pest management inputs, monitoring and evaluation, awareness creation, stakeholder engagement activities, and contingency provisions. The budget is based on exchange rate of ₦1,450 to USD 1.00.

Component	Estimated Budget (₦)	Budget (US\$)
Surveillance Infrastructure	4,260,000	2,937.93
Training & Capacity Building	5,700,000	3,931.03
Inputs Procurement	14,800,000	10,206.90
Monitoring & Evaluation	3,000,000	2,069.00
Awareness & Engagement	2,000,000	1,379.31
Stakeholder Engagement Implementation	43,540,000	30,027.59
Subtotal	73,300,000	50,551.72

Contingency (10%)	7,330,000	5,034.48
Overall PMP Implementation Cost	80,630,000	55,606.90

The total estimated cost for implementation of the Pest Management Plan (PMP) is therefore Eighty Million, Six Hundred and Thirty Thousand Naira (₦80,630,000), equivalent to Fifty-Five Thousand, Six Hundred and Six United States Dollars and Ninety Cents (US\$55,606.90).

ES 12: Monitoring and Evaluation

Monitoring and Evaluation provide the adaptive backbone of the PMP. Indicators track pest incidence, IPM adoption, pesticide use, health outcomes, and environmental compliance. Data are collected through standardized templates and integrated into a centralized dashboard. At the field level, implementation will be monitored through routine site inspections, farmer field assessments, supervision by agricultural extension officers, and periodic compliance audits conducted by the Project Implementation Unit (PIU) and Ogun State Ministry of Agriculture. Non-compliance with PMP provisions will be addressed through corrective action notices, follow-up inspections, and targeted retraining where necessary to ensure adherence to approved pest management protocols. Periodic reviews and independent evaluations inform continuous improvement and safeguard compliance.

ES 13: Conclusion

The Pest Management Plan for the Ogun SAPZ Agricultural Transformation Centre provides a comprehensive, compliant, and practical framework for sustainable pest management. By integrating IPM, institutional coordination, health and environmental safeguards, stakeholder engagement, and adaptive monitoring, the PMP reduces pest losses while protecting people and ecosystems.

Aligned with AfDB ISS, World Bank ESS3, and FAO IPM principles, the PMP positions the ATC as a model for climate-smart, safe, and competitive agro-industrial development. It enhances productivity, reduces hazardous chemical reliance, strengthens institutional capacity, and ensures long-term sustainability of the Ogun SAPZ.

SECTION 1: INTRODUCTION

1.1 Background

This Pest Management Plan (PMP) has been prepared to prevent, manage, and monitor pest-related risks associated with the proposed Agricultural Transformation Centers (ATCs) at Ijebu-Ittele (Ijebu East LGA) and Imasayi-Sawonjo (Yewa North LGA) under the Ogun State Special Agro-Industrial Processing Zones (SAPZ) Project. The PMP applies across all phases of the project lifecycle—pre-construction, construction, operation, and decommissioning—and adopts an Integrated Pest Management (IPM) approach that prioritizes preventive and environmentally sound pest control methods, while minimizing reliance on chemical pesticides.

The Plan is aligned with the African Development Bank's Integrated Safeguards System (ISS, 2023), particularly Operational Safeguard 3 (OS3) on resource efficiency and pollution prevention, as well as relevant provisions of the World Bank Environmental and Social Standard 3 (ESS3) and FAO/WHO Integrated Pest Management principles. It also complies with applicable Nigerian regulatory frameworks, including the Federal Ministry of Environment (FMEnv) guidelines and National Agency for Food and Drug Administration and Control (NAFDAC) regulations on pesticide registration, handling, and use. This alignment ensures that pest management practices under the Ogun SAPZ Project meet international best practice while remaining practical and appropriate for local conditions.

The proposed ATCs form part of the Federal Government of Nigeria's SAPZ Programme, implemented by the Federal Ministry of Agriculture and Food Security (FMAFS) in collaboration with the Ogun State Government, development partners, relevant MDAs, and the private sector, with financing support from the African Development Bank (AfDB), Islamic Development Bank (IsDB), International Fund for Agricultural Development (IFAD), and counterpart funding from the Federal and State Governments. The ATCs are designed to support aggregation, basic processing, and logistics for priority value chains such as cassava, rice, oil palm, cocoa, and timber within their catchment areas, thereby reducing post-harvest losses, improving market access, and generating employment opportunities for rural communities, particularly women and youth.

Notwithstanding these expected benefits, the nature and scale of ATC development and operations may create conditions that encourage pest and vector proliferation if not properly managed. Key risk scenarios include:

- Construction-phase risks, such as vegetation clearing, earthworks, temporary water accumulation, and workers' camps, which may increase rodent populations and mosquito breeding.

- Operational-phase risks, including the storage, aggregation, and handling of large volumes of agricultural produce, organic waste, and packaging materials that can attract storage insects, rodents, molds, and other pests.
- Landscape and drainage-related risks, where poorly managed green areas and storm-water infrastructure may provide breeding grounds for mosquitoes and invasive plant species.
- Community interface risks, arising from increased movement of people, vehicles, and produce between the ATCs and surrounding communities, potentially facilitating the spread of pests and disease vectors.

If unmanaged, pest infestations could result in economic losses from spoilage and contamination of produce, public health risks to workers and host communities, environmental degradation from inappropriate pesticide use, and reputational risks affecting regulatory compliance and AfDB safeguard commitments.

In response, this PMP constitutes a stand-alone safeguard instrument that complements the ESIA, RAP/LRP, SEP, and other Environmental and Social Management Plans prepared for the Ogun SAPZ Project. The PMP is intended to:

- Provide a structured framework for Integrated Pest Management tailored to ATC facilities and operational activities;
- Define clear institutional roles, responsibilities, and resources for pest prevention, monitoring, and control;
- Promote non-chemical, biological, cultural, and mechanical control methods before considering chemical interventions;
- Safeguard the health and safety of workers, contractors, farmers, and surrounding communities; and
- Ensure full compliance with Nigerian statutory requirements and AfDB Operational Safeguard 3.

Overall, this PMP serves both as a risk management tool and a capacity-building instrument, integrating international best practice with local realities in Ogun State. Its implementation will support environmentally sustainable agro-processing operations and provide a transparent, auditable framework for pest management throughout the lifecycle of the Ogun SAPZ ATC Projects.

1.2 Objectives of the Pest Management Plan (PMP)

The objectives of this Pest Management Plan (PMP) for the Ogun State SAPZ Agricultural Transformation Centers (ATCs) are to ensure environmentally sound, safe, and effective pest management practices that support sustainable agricultural production and agro-processing. Specifically, the PMP seeks to:

1. Avoid the Use of Highly Hazardous Pesticides (HHPs):
Prohibit the procurement and use of WHO Class Ia and Ib pesticides under the project, except where strictly justified and subject to applicable regulatory

approval and controlled conditions. Promote the use of safer, NAFDAC-approved alternatives and Integrated Pest Management (IPM) practices to minimize risks to human health and the environment. Promote adoption of Integrated Pest Management (IPM):

Encourage farmers, aggregators, and operators within the ATC catchment areas to apply IPM principles – such as crop rotation, use of resistant varieties, biological control, good sanitation, and threshold-based pesticide application – to reduce chemical dependence.

2. Strengthen pest surveillance and monitoring:
Establish routine pest monitoring and reporting mechanisms at the ATC and community levels to enable early detection of pest outbreaks and evidence-based decision-making.
3. Enhance capacity of farmers and extension workers:
Build the skills of farmers, extension officers, and ATC operators on IPM practices, safe pesticide handling, storage, and application through targeted trainings, demonstrations, and extension support.
4. Improve pesticide handling, storage, and disposal practices:
Promote proper storage, labeling, transportation, and disposal of pesticides and empty containers in compliance with FMEnv, NESREA, and NAFDAC regulations.
5. Promote environmental protection and occupational health and safety:
Reduce pesticide-related health risks to farmers, workers, and surrounding communities through the use of appropriate personal protective equipment (PPE), safety awareness campaigns, and adherence to regulatory standards.
6. Support institutional coordination and compliance:
Strengthen collaboration among relevant government agencies, ATC operators, extension services, and farmer groups to ensure effective PMP implementation and compliance with AfDB Integrated Safeguards System requirements.

1.3 Purpose and Scope of the Pest Management Plan

The purpose of this Pest Management Plan (PMP) is to safeguard agricultural productivity, human health, and environmental quality within and around the Ogun State SAPZ Agricultural Transformation Centers by providing a structured and sustainable approach to pest management based on Integrated Pest Management (IPM) principles.

The scope of the PMP covers all agricultural activities linked to the Agricultural Transformation Centres (ATCs) at Ijebu-Itele in Ijebu East Local Government Area and Imasayi-Sawonjo in Yewa North Local Government Area of Ogun State, including all farming, aggregation, storage, and primary processing activities undertaken within the ATCs and their respective surrounding catchment communities/supply zones that provide agricultural produce to the facilities. The catchment areas encompass the immediate host communities and adjoining farming settlements within the designated supply radius of each ATC, from which raw materials and agricultural commodities are sourced for processing and aggregation. The PMP specifically

applies to the production, aggregation, storage, and primary processing of key value chains such as cassava, rice, oil palm, cocoa, and other relevant crops cultivated and transported within these operational catchment areas. The PMP integrates environmental protection, occupational health and safety, and regulatory compliance considerations and is intended to remain a living document applicable throughout the planning, construction, operation, and decommissioning lifecycle of the ATCs.

1.4 Rationale for the Pest Management Plan

The preparation of a Pest Management Plan is required to ensure compliance with international development partner safeguards—particularly the African Development Bank Operational Safeguard 3—and relevant national regulations governing pesticide use and environmental protection. Experience has shown that unmanaged or inappropriate use of pesticides can lead to significant environmental degradation, health risks, and food safety concerns.

The PMP therefore provides a preventive and proactive framework for managing pest-related risks in a manner that protects ecosystems, safeguards public health, and supports the sustainability objectives of the Ogun SAPZ Project.

1.5 Environmental and Social Consequences of Pest Management Practices

Within the project areas of influence for the Ijebu-Ittele ATC in Ijebu East LGA and Imasayi-Sawonjo ATC in Yewa North LGA, baseline consultations and findings from the ESIA indicate that smallholder farmers engaged in the cultivation of cassava, rice, cocoa, oil palm, and other crops commonly rely on the use of agrochemicals, including pesticides and herbicides, as part of routine farm management practices. The use of these chemicals is often characterized by limited technical guidance, informal handling practices, and inadequate adherence to recommended application standards.

In the project catchment areas, there is potential for pesticide runoff from farmlands into nearby drainage channels, surface water bodies, and adjoining lands, particularly during rainfall events, while improper disposal of used pesticide containers may contribute to localized environmental contamination. Additionally, indiscriminate pesticide application may affect beneficial non-target organisms such as pollinators and natural pest predators, thereby disrupting ecological balance within surrounding agricultural ecosystems.

From a socio-health perspective, field assessments indicate that many local farmers and farm workers—including women and youth actively engaged in farming and post-harvest activities—have limited access to appropriate personal protective equipment (PPE) and often lack formal training on safe pesticide handling and application. This may increase the risk of occupational exposure and associated health concerns during pesticide mixing, spraying, storage, and disposal. Improper pesticide application may also create the risk of chemical residues in harvested produce, which could affect food safety and product quality.

The PMP addresses these identified site-specific risks by promoting Integrated Pest Management (IPM), restricting the use of highly hazardous pesticides, improving pesticide handling and disposal practices, and strengthening farmer training, awareness, and occupational health and safety measures throughout the ATC catchment areas.

1.6 Potential Impacts of Pest and Pesticide Management on Project Activities

Pest infestations affecting key value chains linked to the Ogun SAPZ ATCs have the potential to significantly reduce crop yields, compromise produce quality, and disrupt reliable supply to processing facilities. Post-harvest pests and fungal contamination may also result in product rejection, economic losses, and failure to meet regulatory and market standards.

Conversely, excessive or inappropriate use of pesticides can lead to residue exceedances, pest resistance, environmental pollution, and health and safety incidents, which may negatively affect project reputation and compliance with AfDB and national safeguard requirements.

The PMP provides a balanced framework that ensures effective pest control while minimizing environmental, health, and safety risks. Through regular monitoring, threshold-based interventions, preference for non-chemical control methods, and adherence to approved pesticide lists, the PMP supports sustainable agricultural production, protects communities and ecosystems, and enhances the long-term viability of the Ogun SAPZ ATCs.

SECTION 2: PROJECT DESCRIPTION

2.1. Description of the SAPZ Project Location in Ogun State

The SAPZ Project in Ogun State requires an Environmental and Social Impact Assessment (ESIA) and Livelihood Restoration Plan for the Agricultural Transformation Centres (ATCs). In addition, given the multi-sectoral and sensitive nature of the SAPZ Project, the likely involvement of multi-layered stakeholders, and the anticipated use of farm enhancement inputs including agrochemicals, it is necessary to prepare and effectively implement a Stakeholder Engagement Plan (SEP) and Pest Management Plan (PMP).

The SAPZ Programme has been classified as a Category 1 Project under the Integrated Safeguards System (ISS) and Environmental and Social Assessment Procedures (ESAP) of the African Development Bank (AfDB), as well as applicable national environmental policies and regulations, including Ogun State environmental regulations. This categorization is based on the large-scale, multi-sectoral, and environmentally sensitive nature of the programme. The environmental and social safeguard concerns associated with the Project are to be addressed through the outcome of this study and its recommendations.

Below is the site-specific description of the geographic locations of the selected Agricultural Transformation Centres, namely Ijebu-Itele ATC located in Ijebu East Local Government Area and Imasayi-Sawonjo Farm Settlement ATC located in Yewa North Local Government Area of Ogun State.

2.1.1 Technology Park Iwaya-Itele, Ijebu-Ife

Technology Park (6°45'48.7"N, 4°03'22.28"E) is in Itele, Ijebu-Ife of Ijebu East Local Government Area of Ogun State, Nigeria (Fig. 1). Ijebu-ife is situated close to Itele, Esure, Idofe, Iwaya, Imuwen, Isagunsen and Ibelu locality. The closest landmark to the area is Osun river which is about 25km south. The Technology park is one thousand hectares

(1000ha). A land area of twenty hectares (20ha) will be used for the construction of the ATC. Two connecting asphalt road (dual lane) of 4km each (8km) linking the ATC to the main express way and adjoining town will also be constructed. The proposed ATC is intended to promote large scale production and primary processing of Cassava, Rice, Timber, Oil palm and Cocoa value chains. These commodities would be transported from the ATC to the Main Agricultural Industrial Hub (AIH) Iperu, Remo North for final processing and value addition.

2.1.2 ATC Imasayi-Sawonjo Farm Settlement

Sawonjo community (Latitude - 7.083333, Longitude - 3.016667) is located between Igbogila and Igan Ikoto in Yewa Local Government Area of Ogun State, Nigeria (Fig. 1). Landmarks in the area include; River Iju which is 17km southwest, River Idi that is 12km southwest and a park which is 17km north. The farm settlement covers over Fifty (50) hectares. A land area of twenty (20) hectares will be used for the construction of the ATC. Two connecting asphalt roads (dual lane) linking the ATC to Sawonjo town from Imasayi and Iboro (about 8km) will also be constructed. The proposed ATC is intended to promote large scale production and primary processing of Cassava, Rice and Oil palm value chains.

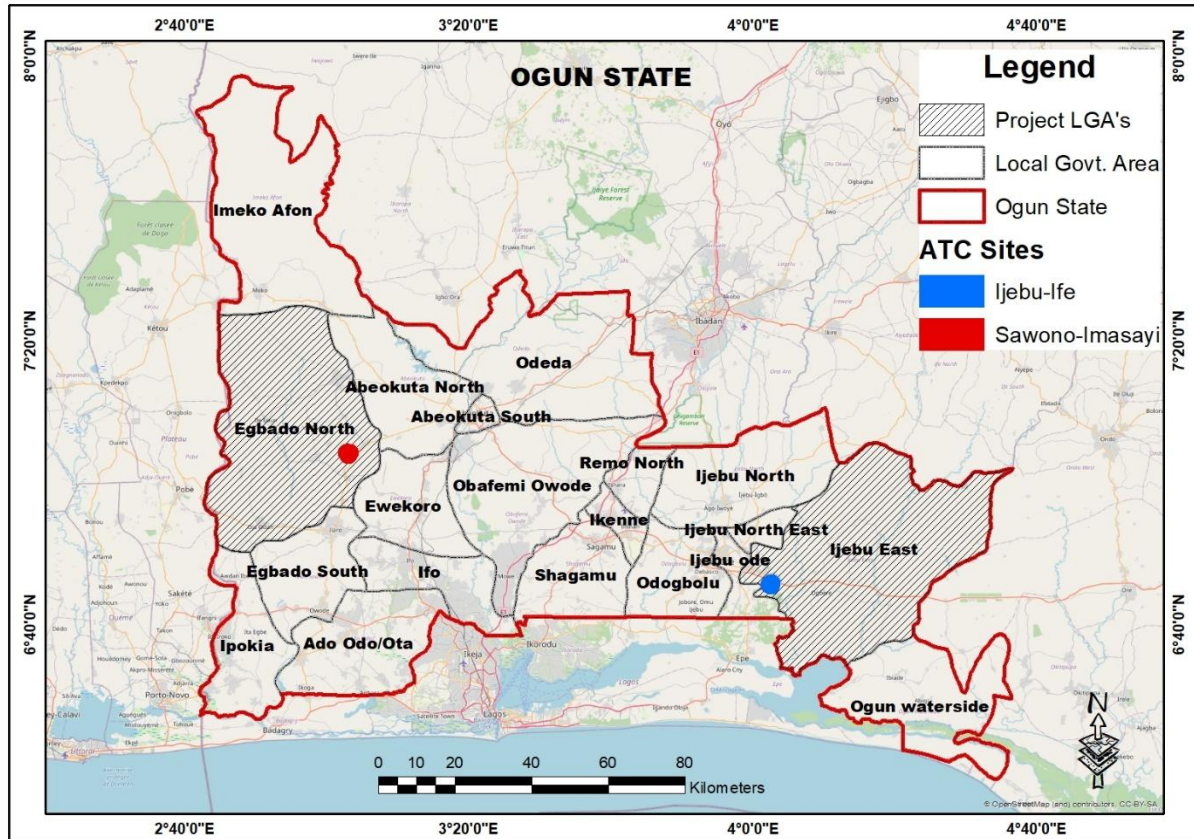


Figure 1: Location Map of the Proposed ATC at Iwaya, Ijebu East and Imasayi-Sawonjo

2.2. Project Layout

The Ogun State SAPZ intervention involves the development of Agricultural Transformation Centers (ATCs) under a site and services development model, rather than a full-scale, investor-built agro-industrial hub. Each ATC is planned to occupy approximately 20 hectares within the larger designated sites at Imasayi-Sawonjo (Yewa North LGA) and Itele, Ijebu-Ife (Ijebu East LGA).

The ATCs are designed to provide shared, enabling infrastructure to support aggregation and primary processing of targeted agricultural commodities, while serving as collection and transfer points for onward movement to the Agro-Industrial Hub (AIH) at Iperu, Remo North, for secondary processing and value addition.

The layout of each ATC has been informed by the engineering designs and value-chain requirements of the project and includes clearly delineated zones for administration, processing, storage, utilities, waste management, and circulation. Provision has also been

made for external and internal access roads, drainage systems, buffer areas, and safety setbacks to ensure efficient operations and compliance with environmental, social, health, and safety standards.

Overall, the layout is intended to minimize land take, optimize traffic flow, reduce environmental and social impacts, and support effective implementation of safeguard instruments, including the Environmental and Social Management Plan (ESMP) and the Pest Management Plan (PMP).

2.2.1 Components of the Agricultural Transformation Centers (ATCs) in Ogun State

The proposed ATCs will comprise essential civil, utility, and support infrastructure required for agricultural aggregation and primary processing. Core infrastructure components will include:

- Administrative and office buildings;
- Training and capacity-building facilities;
- Perimeter fencing and security infrastructure;
- Internal access roads, parking areas, and pedestrian walkways;
- Drainage systems and stormwater management structures;
- Power supply systems (including grid and standby sources);
- Water supply and storage facilities;
- Sanitation, sewerage, and effluent management systems; and
- Occupational health and safety infrastructure.

Facilities with direct relevance to the Pest Management Plan (PMP) will include quality control and inspection points, produce handling areas, storage facilities, and limited laboratory or testing units for produce assessment. These facilities will support adherence to good agricultural practices (GAP), integrated pest management (IPM) principles, and safe handling of agro-inputs across the ATC catchment areas.

In addition, the ATCs will provide business and extension support services, such as administrative coordination units, information and communication platforms, and farmer engagement spaces, to facilitate implementation of agricultural support programs under the SAPZ project. The ATCs will operate as shared-use facilities, providing common infrastructure and services for farmers, aggregators, extension agents, and

operators within the catchment areas. Detailed technical descriptions of the proposed infrastructure and utilities are presented in subsequent sections of this report.

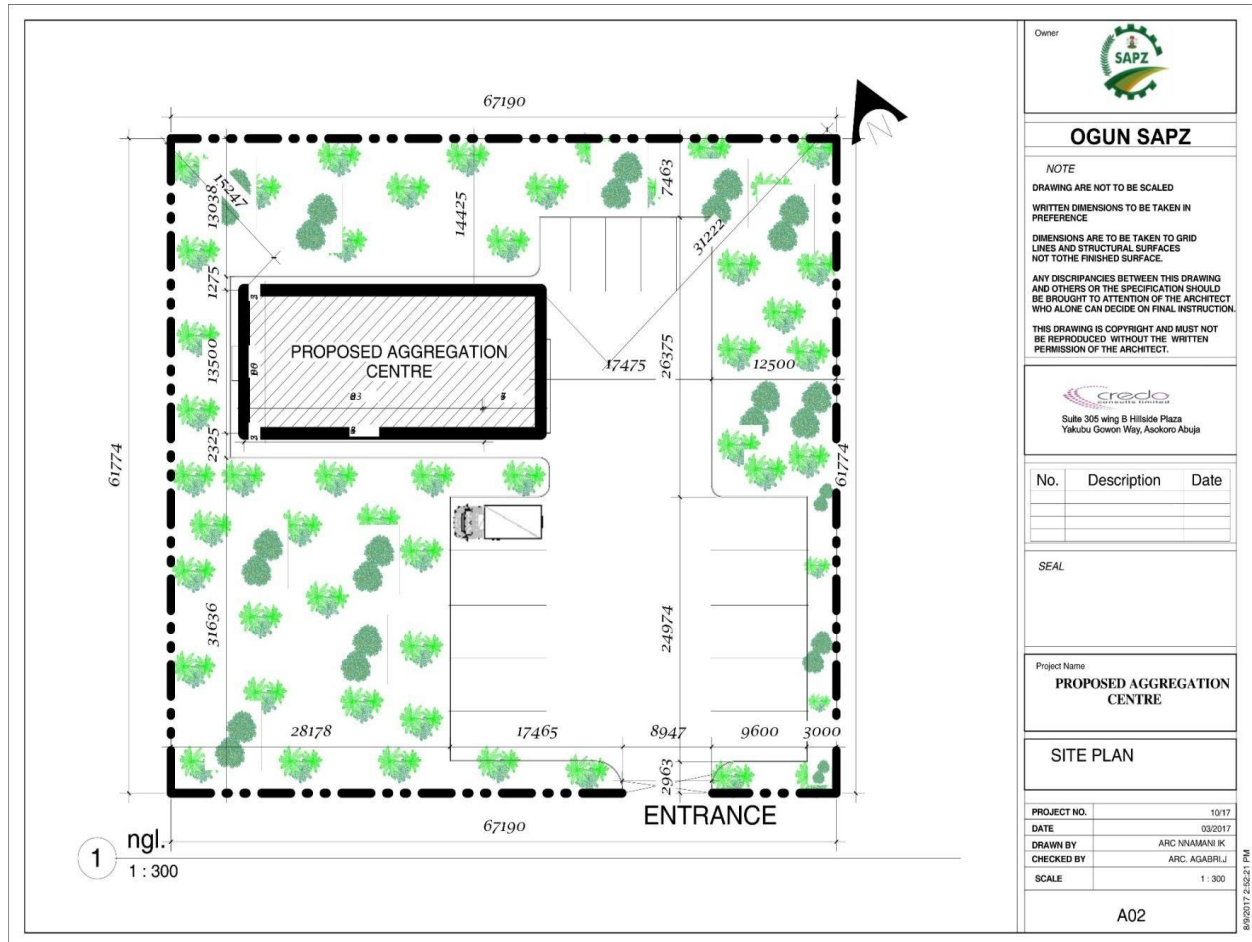


Figure 2: Proposed ATC Layout

Table 2.1 Facility Design Details

Design Details of ATC	
Area in Ha	20 ha
Design	4 Months
Construction	18 Months
External Road	Length: 8km dual carriage ROW: 10m wide, with solar street lights and channel kerbs.
Drain	Length: 3804 Rmt - ranging from 500mm x 500mm to 1000mm x 1000mm
Electrical	
Power Source	0.2 km to the substation, 33 kV line along the plot boundary
Power Demand	13MVA
Distribution length	3.8 km
Sub-station	Compact substation of 1000 kVA
Water	
Source	Solar Borehole
Demand	1500 KLD
borewell	1 Nos
Storage	500 KLD Capacity
Wastewater	
Generation	1550 KLD
STP	1000 KLD
Conveyance	3.8 Km of HDPE pipe ranging from 225 mm to 280 mm
Buildings	1. Administrative Block + Research and Development + Disaster Management - 400 Sqm
Public Toilet	60 Sqm - 8 WCs x 2
Gate & Gatehouse	1 Nos
Access Roads	Access Road is considered 8km dual carriage from highway to the plot

2.3 Need for the Project

The need for the proposed Ogun State Special Agro-Industrial Processing Zone (SAPZ) intervention arises from persistent structural constraints affecting agricultural productivity, aggregation, processing, and market access within the State's priority value chains. Despite Ogun State's strategic location, favourable agro-ecological conditions, and proximity to major domestic and export markets, agriculture remains dominated by smallholder, subsistence-oriented production systems characterized by low productivity, limited value addition, and high post-harvest losses.

A significant proportion of rural households in Ogun State depend on agriculture for their livelihoods. However, challenges such as inadequate rural infrastructure, limited access to modern inputs and extension services, weak storage and aggregation facilities, poor linkage to structured markets, and limited access to finance continue to undermine the competitiveness of the sector. These challenges are further compounded by youth out-migration, ageing farming populations, and growing pressure on food systems.

The development of Agricultural Transformation Centers (ATCs) under the Ogun SAPZ is intended to address these systemic constraints by providing shared infrastructure and services for aggregation, primary processing, quality control, and structured market access. The ATCs will function as nodal points linking farmers to the Agro-Industrial Hub (AIH) at Iperu, Remo North, thereby strengthening value chain coordination, improving operational efficiency, and reducing post-harvest losses.

The SAPZ approach supports national and state-level priorities on food and nutrition security, economic diversification, job creation, and rural development, while creating an enabling environment for private sector participation in agro-processing and agribusiness development. By improving productivity and value addition within targeted value chains, the project is expected to contribute to improved livelihoods, increased incomes, and inclusive growth in Ogun State.

Constraints in Priority Crop Value Chains in Ogun State

Key constraints affecting agricultural value chains in Ogun State, which the SAPZ intervention seeks to address, include the following:

Table 2.2: Production, Marketing, and Processing Constraints

Production Constraints	Marketing Constraints	Processing Constraints
Low productivity due to limited adoption of improved agronomic practices, compounded by climate variability (irregular rainfall patterns and rising temperatures).	Limited access to structured and guaranteed markets, with climate-related production fluctuations affecting supply reliability.	Inadequate aggregation and primary processing facilities, increasing vulnerability to climate-induced post-harvest losses.
Pest and disease pressures affecting crop yields, exacerbated by changing climate conditions that increase the prevalence and spread of pests and vectors.	Price volatility and weak bargaining power of smallholder farmers, worsened by climate-induced yield variability and seasonal supply shocks.	Limited access to appropriate and climate-resilient processing technologies.
Inadequate access to certified seeds, fertilizers, and crop protection inputs, including limited availability of climate-	Poor storage facilities leading to high post-harvest losses, intensified by higher temperatures and humidity.	Erratic power supply and high energy costs, with climate extremes affecting infrastructure reliability.

resilient and drought-tolerant varieties.		
Weak extension and advisory services, including limited capacity to provide climate-smart agriculture and adaptation guidance.	Limited access to affordable finance, with climate risks increasing lending constraints and investment uncertainty.	Inconsistent supply and quality of raw agricultural produce due to climate-related production variability.

These constraints underscore the need for integrated infrastructure, institutional support, and coordinated interventions as proposed under the Ogun SAPZ.

2.4 Benefits of the Project

The SAPZ intervention in Ogun State is expected to generate broad-based economic, social, and environmental benefits by strengthening agricultural value chains, promoting value addition, and catalyzing private sector investment. The project will contribute to improved food security, employment generation, income enhancement, and poverty reduction, while supporting sustainable agricultural practices consistent with national and AfDB development objectives.

2.4.1 Socio-Economic Benefits of the Project

The Ogun SAPZ aligns with the Federal Government of Nigeria's economic diversification agenda by promoting agriculture and agro-processing as viable non-oil growth drivers. The project complements ongoing public- and private-sector initiatives aimed at improving agricultural productivity, enhancing market integration, and supporting inclusive economic growth.

By facilitating aggregation and primary processing through the ATCs, the project will help reduce post-harvest losses, improve product quality, and enhance access to domestic and export markets. Improved market linkages and value chain coordination are expected to stabilize farm incomes and stimulate increased production among smallholder farmers.

The SAPZ intervention will also contribute to rural economic transformation by creating employment opportunities across the value chain, including farming, logistics, processing, maintenance, and support services. Improved economic prospects within host communities are expected to reduce rural-urban migration, particularly among youth and women.

Capacity-building initiatives associated with the project, including training in Good Agricultural Practices (GAP), Integrated Pest Management (IPM), post-harvest handling, and occupational health and safety, will enhance farmer knowledge and productivity while supporting environmental and social sustainability.

2.4.2 Benefits to Government

The project will improve the business enabling environment in Ogun State by providing serviced agricultural infrastructure and enhancing ease of doing business for agribusiness investors. Increased private sector participation will generate revenues for government through taxes, levies, and service fees, while strengthening public-private collaboration in the agricultural sector.

2.4.3 Benefits to Host Communities

The SAPZ intervention is expected to generate direct and indirect benefits for host communities, including:

- Improved access to markets for agricultural produce;
- Employment opportunities for local populations, particularly youth and women;
- Skills development through targeted training and capacity-building programs;
- Improved rural infrastructure, including roads and utilities;
- Improved community safety and asset protection associated with organized economic activity; and
- Community development initiatives supported by private sector operators operating within the SAPZ framework.

2.4.4 Financial and Social Inclusion

The project will facilitate access to finance and business development services for farmers, aggregators, and small and medium agribusinesses operating within the SAPZ catchment areas. Enhanced inclusion is expected to improve household incomes and strengthen resilience among agricultural value chain actors.

2.4.5 Road Access and Infrastructure Development

The project includes the development and rehabilitation of access roads and internal circulation networks to improve movement of agricultural produce, inputs, and personnel, thereby reducing transportation costs and enhancing market efficiency.

2.4.6 Market Accessibility

The SAPZ will create structured and reliable market access for targeted agricultural commodities, resulting in:

- Reduced post-harvest losses due to proximity to aggregation and processing facilities;
- Improved price stability and income predictability for farmers;
- Expanded employment opportunities along the value chain; and
- Strengthened local economic activity within and around host communities.

2.4.7 Benefits to Investors

Investors operating within the Ogun SAPZ will benefit from shared infrastructure and services that reduce capital and operational costs. The availability of serviced sites will facilitate compliance with national and international standards related to food safety, quality assurance, and environmental management, including applicable certification requirements.

Collectively, these benefits are expected to enhance investment attractiveness, operational efficiency, and long-term sustainability of agribusiness operations within Ogun State.

2.5 Value of the Project

The Ogun State Special Agro-Industrial Processing Zone (SAPZ) is anchored **on** priority agricultural value chains identified in the TOR and project design, for which Ogun State has a demonstrated comparative advantage. These crops benefit from favourable agro-ecological conditions, an existing production base, proximity to major consumption and export markets, and strong private sector interest.

The Agricultural Transformation Centers (ATCs) are designed to support aggregation, primary processing, storage, quality control, and market coordination for these priority crops, while serving as feeder nodes to the Agro-Industrial Hub (AIH) for secondary processing and value addition. The SAPZ approach therefore focuses on crops with high volumes, strong industrial demand, and inclusive livelihood potential.

In line with the TOR and engineering design, cassava, oil palm, cocoa and grain-based value chains represent the core crops of interest for the Ogun SAPZ.

Table 2.3: Potential Cassava Value Chain under Ogun SAPZ

Potential Value	Details
Potential for value addition	✓ Yield improvement through adoption of improved varieties and Good Agricultural Practices (GAP) ✓ Availability of certified stems through structured out-grower systems ✓ Improved primary processing (garri, cassava chips, flour) at ATC level ✓ Strong linkage to industrial processors for starch, ethanol, and high-quality cassava flour ✓ Significant import substitution potential for cassava-based industrial inputs
Market potential	✓ High and sustained domestic demand for cassava products ✓ Opportunities for bulking and collective sales through cooperatives linked to off-takers ✓ Stable industrial demand driven by food, beverage, and manufacturing sectors
Pro-poor growth and gender relevance	✓ High participation of women in cassava production, processing, and marketing ✓ Small-scale processing and retail trade dominated by women ✓ Improved market access and processing expected to raise smallholder incomes
Job creation in downstream sectors	✓ Employment in aggregation, processing, storage, and logistics ✓ Increased opportunities in transport, equipment maintenance, and marketing services ✓ Expansion of MSMEs along the cassava value chain

Table 2.4: Potential Oil Palm and Grain-Based Value Chains under Ogun SAPZ

Potential Value	Details
Potential for value addition	✓ Improved quality of palm produce and grain outputs through better harvesting, handling, and primary processing ✓ Introduction of appropriate mechanization and out-grower support services ✓ Training on GAP and safe use of agro-inputs in line with IPM principles ✓ Improved access to certified climate resilient seedlings and seeds

	✓ Strengthened coordination among farmers, aggregators, processors, and off-takers
Market potential	✓ Strong domestic demand for palm oil and grain-based products ✓ Established linkages to food, feed, and manufacturing industries ✓ Import substitution potential, particularly for edible oil and livestock feed inputs
Pro-poor growth and gender relevance	✓ Active involvement of women in processing, trading, and retailing ✓ Youth engagement in aggregation, logistics, and mechanization services ✓ Opportunities for inclusive participation across the value chain
Job creation in downstream sectors	✓ Employment in processing, storage, transportation, and input supply ✓ Engagement of machinery operators, technicians, and service providers ✓ Growth of small and medium agribusiness enterprises supported by ATCs
Natural endowment	✓ Suitable agro-ecological conditions in Ogun State for oil palm and grain production
Profitability	✓ High profitability potential where quality standards and off-taker requirements are met, supported by shared infrastructure and reduced transaction costs

2.6 Envisaged Sustainability

Sustainability, in the context of the Ogun State Special Agro-Industrial Processing Zone (SAPZ), refers to the ability of the project to maintain its operational relevance, service delivery, and development benefits throughout its implementation phase and well beyond the project life cycle. For the Agro-Transformation Centre (ATC), sustainability is defined by the extent to which the infrastructure, services, and institutional arrangements continue to support agribusiness value chains in a manner that is environmentally sound, socially acceptable, economically viable, and technically resilient.

The sustainability of the Ogun SAPZ intervention is assessed across four interrelated dimensions: environmental, social, economic, and technical sustainability, with particular emphasis on responsible pest and pesticide management given the anticipated intensification of agro-processing and aggregation activities.

2.6.1 Environmental and Pest-Management Sustainability

To ensure long-term environmental sustainability, the ATC integrates pest management practices that balance productivity with environmental protection, public health safeguards, and regulatory compliance. The Pest Management Plan (PMP) emphasizes

preventive, non-chemical, and risk-based approaches suited to Ogun State's agro-ecological conditions and mixed rural–peri-urban landscape.

Key sustainability measures include the following:

1. Reduced Dependence on Chemical Pesticides

- a. Adoption of Integrated Pest Management (IPM) principles as a first line of action, prioritizing cultural, biological, and mechanical control methods over chemical interventions.
- b. Promotion of appropriate crop rotation, improved varieties, proper post-harvest handling, and hermetic storage technologies, particularly for aggregation and storage facilities within the ATC.
- c. Restriction of pesticide use to NAFDAC-approved products, with explicit exclusion of WHO Class Ia and Ib active ingredients and progressive reduction in reliance on Class II pesticides.
- d. Application of threshold-based pest control, supported by routine pest scouting, extension services, and digital reporting tools where applicable, to prevent unnecessary pesticide use.

2. Strengthening IPM Adoption and Institutional Capacity

- a. Integration of IPM modules into capacity-building programmes for farmers, aggregators, off-takers, and ATC operators, including Training of Trainers (ToT) arrangements.
- b. Engagement of youth and extension agents as community-based pest surveillance focal persons, enhancing early detection and response to pest outbreaks.
- c. Promotion of biological control options and bio-pesticides, including botanicals and environmentally benign formulations, consistent with local availability and regulatory approval.
- d. Continuous monitoring and adaptive management to respond to evolving pest dynamics, climate variability, and market requirements.

3. Safe Storage, Handling, and Disposal Practices

- a. Enforcement of good practices for handling, storage, and disposal of agro-chemicals, including triple-rinsing and puncturing of empty pesticide containers.
- b. Provision of secure pesticide storage facilities within the ATC, equipped with adequate ventilation, spill-containment materials, and fire-safety equipment.
- c. Full compliance with NESREA regulations, Ogun State environmental laws, and Good International Industry Practice (GIIP).

- d. Awareness campaigns to discourage unsafe reuse of pesticide containers and promote shared environmental responsibility.

Through these measures, pest management under the Ogun SAPZ will contribute not only to productivity gains but also to long-term environmental protection and regulatory compliance.

2.6.2 Social Desirability

The social desirability of the Ogun SAPZ ATC is anchored on stakeholder acceptance, inclusive benefit-sharing, and responsiveness to community concerns. Stakeholder Engagement Plans (SEP) have been designed and will be implemented across all project phases – from scoping and baseline surveys to public consultation and disclosure.

The effective implementation of environmental and social instruments, including the Pest Management Plan (PMP) and Livelihood Restoration Plan (LRP), is expected to reinforce social acceptance and ownership of the project by host communities.

Specific measures to enhance social sustainability include:

- Inclusion of vulnerable groups, including women, youth, elderly persons, persons with disabilities, and economically marginalized households, in consultation, training, and employment opportunities.
- Implementation of Corporate Social Responsibility (CSR) initiatives by private operators within the ATC, targeting education, health, skills development, and community infrastructure.
- Preference for local employment during construction, operation, and service delivery phases, subject to availability of requisite skills.
- Promotion of skills development, mentorship, and capacity-building programmes, particularly for youth and women, to enhance employability and local participation in SAPZ value chains.

2.6.3 Economic Viability

The economic viability of the Ogun SAPZ ATC is underpinned by its role in addressing systemic constraints across agricultural value chains, including post-harvest losses, limited processing capacity, high transaction costs, and weak market linkages.

By providing shared infrastructure, aggregation services, processing support, logistics, and market access, the ATC is expected to improve productivity, enhance value addition, and increase returns for farmers and agribusiness investors alike. Ogun State's strategic location—adjacent to Lagos and major industrial corridors—further enhances the commercial attractiveness and market integration of the SAPZ.

The project is anticipated to generate:

- Direct and indirect employment across farming, aggregation, processing, transport, storage, and ancillary services;
- Increased household incomes and improved livelihoods;
- Enhanced local and regional trade, contributing to state and national economic growth.

2.7 Development Options with Pest-Management Implications

a. No-Project Option

Under a no-project scenario, existing pest management challenges in Ogun State would persist, characterized by:

- a. Continued reliance on informal and often unsafe pesticide use by smallholders and aggregators.
- b. Ongoing crop losses due to pests and diseases, particularly at pre- and post-harvest stages.
- c. Absence of structured IPM support, surveillance systems, and institutional coordination.

Implication: Pest-related risks remain unmanaged, with escalating environmental, health, and economic consequences.

b. Delayed Project Option

Delaying implementation of the ATC would result in:

- a. Prolonged dependence on hazardous and inefficient pest control practices.
- b. Increased vulnerability to pest outbreaks exacerbated by climate variability and intensified production.
- c. Missed opportunities for coordinated training, surveillance, and safe waste-disposal systems.

Implication: Persistent productivity losses and higher long-term control costs.

c. Immediate Project Implementation (Preferred Option)

Immediate implementation enables:

- a. Establishment of structured IPM systems integrated into ATC operations and service delivery.
- b. Deployment of monitoring tools and extension support for early detection and response.

c. Adoption of safe pesticide handling, storage, and disposal practices in line with national and international standards.

Implication: Pest risks are proactively managed, enhancing sustainability, compliance, and value-chain resilience.

2.8 Project Site Alternatives – Pest Management Considerations (Ogun SAPZ)

Site selection for the Ogun SAPZ ATC considered not only infrastructure and socioeconomic factors but also pest-management implications relevant to the PMP.

Alternative locations assessed revealed varying constraints related to flooding, accessibility, proximity to production clusters, and compatibility with safe agro-chemical handling. Sites with poor drainage, limited access roads, or distance from farmer catchment areas posed higher risks of delayed pest surveillance, increased post-harvest losses, and challenges to safe pesticide storage.

The preferred ATC site of Iwaya, Ijebu East and Imasayi-Sawonjo offers:

- Adequate accessibility for extension services and logistics;
- Proximity to production clusters and markets;
- Suitable land use and topography for storage, processing, and waste management;
- Institutional feasibility for deploying IPM training, surveillance, and safe disposal infrastructure.

Outcome: The selected site provides the most conducive setting for implementing an effective, scalable, and sustainable pest management system aligned with Ogun SAPZ objectives.

2.9 Description of ATC Crops and Pests (Ogun SAPZ)

This Pest Management Plan (PMP) applies to agricultural commodities handled within the Ogun State Special Agro-Industrial Processing Zone (SAPZ), specifically at the two proposed Agro-Transformation Centres (ATCs)—Imasayi-Sawonjo Farm Settlement (Yewa North LGA) and Itele (Iwaya) / Technology Park (Ijebu East LGA)

In accordance with the Terms of Reference (TOR) and project design, the ATCs are intended to function as aggregation, primary handling, storage, and logistics nodes, while the AIH provides secondary and industrial processing. The PMP therefore focuses on pest and vector risks associated with field supply, aggregation, storage, and transport, rather than on plantation-scale cultivation.

Based strictly on the TOR and baseline studies, the priority crops of interest for the Ogun SAPZ are cassava, rice, oil palm, cocoa, and timber/wood products. These commodities reflect Ogun State's comparative advantage and the SAPZ's agro-industrial focus.

Table 2.5: Ogun SAPZ – ATC Crops, Key Pests/Vectors and Critical Control Points

Crop (SAPZ Focus)	Typical Pests / Vectors (Ogun State Context)	Critical Control Stage
Cassava (Manihot esculenta)	Cassava green mite, cassava mealybug, whiteflies (vectors of cassava mosaic disease), termites, rodents, root rot pathogens	Farm: planting material selection, field scouting and sanitation; ATC: aggregation, sorting, short-term holding; Transport/AIH: rapid evacuation to processing
Oil Palm (Elaeis guineensis)	African palm weevil (Rhynchophorus spp.), rhinoceros beetle (Oryctes spp.), fungal bud and spear rot	Farm/Plantation: field sanitation and pest monitoring; ATC: handling of fresh fruit bunches and nursery materials where applicable
Cocoa (Theobroma cacao)	Capsids/mirids, black pod disease (Phytophthora spp.), stem canker, pod borers	Farm: pruning, pod sanitation, targeted fungicide use; ATC: temporary storage and quality inspection prior to transport
Rice (Oryza sativa)	Rice stem borers, rice leaf folders, planthoppers, birds and rodents, rice blast (Magnaporthe oryzae), bacterial leaf blight	Farm: use of certified seed, timely planting, field scouting and water management; ATC: drying, threshing, cleaning and rodent-proof storage; Transport/AIH: moisture-controlled handling to prevent mould and insect infestation
Timber / Wood products	Termites, wood-boring beetles, fungal decay organisms	Farm/Woodlot: inspection prior to harvest; ATC: log yard storage, seasoning and inspection; Transport/AIH: movement of infestation-free material

2.10 Pest-Management Implications for the Ogun SAPZ

Given the humid climatic conditions, peri-urban pressures, and high throughput of raw materials anticipated within the Ogun SAPZ corridor, pest-management interventions will prioritize:

- Preventive, non-chemical measures at ATC aggregation and storage facilities;
- Adoption of Integrated Pest Management (IPM) practices among supplying farmers and cooperatives;
- Emphasis on storage hygiene, moisture control, rodent management, and rapid product evacuation for cassava, rice, and cocoa;
- Implementation of vector control measures, including mosquito breeding prevention through proper drainage management, elimination of stagnant water, routine sanitation of construction and operational areas, and periodic fumigation where necessary during construction and operation phases;
- Controlled and limited application of NAFDAC-approved pesticides, strictly excluding WHO Class Ia and Ib products;

- Safe storage, handling, and disposal of pesticides in compliance with NESREA regulations, Ogun State environmental laws, and African Development Bank Integrated Safeguards System (ISS) requirements.

SECTION 3: INSTITUTIONAL ARRANGEMENTS AND RESPONSIBILITIES

3.1 Introduction

Effective pest management for the Ogun State Special Agro-Industrial Processing Zone (SAPZ) requires a coordinated, multi-level institutional framework that supports the planning, implementation, monitoring, and continuous improvement of Integrated Pest Management (IPM) measures across the Agro-Transformation Centres (ATCs). This framework is designed to ensure conformity with national regulatory requirements and African Development Bank Integrated Safeguards System (AfDB ISS 2023) standards, while promoting operational efficiency, accountability, and meaningful stakeholder participation.

This chapter sets out the institutional roles and responsibilities of relevant federal, state, and site-level actors; defines coordination and reporting mechanisms among implementing agencies, operators, and service providers; and outlines capacity-building and oversight arrangements required to sustain effective IPM practices throughout the lifecycle of the Ogun SAPZ.

3.2 Institutional and Policy Framework (AfDB-Aligned)

The Pest Management Plan (PMP) for the Ogun State Special Agro-Industrial Processing Zone (SAPZ) has been prepared in compliance with the African Development Bank (AfDB) Integrated Safeguards System (ISS), particularly Operational Safeguards (OS) 1, 2, 3, 4, 5, 6, 8, and 10, and relevant Nigerian legal and institutional frameworks governing pesticide management, environmental protection, occupational health and safety, and agricultural development.

The PMP is consistent with the following national policy, legal, and regulatory instruments:

- National Agricultural Policy – provides strategic guidance on sustainable crop production and pest management practices.
- National Environmental Policy – establishes environmental protection principles applicable to pest control and chemical use.
- Federal Ministry of Environment (FME) Regulations – governing hazardous substances, waste management, and environmental quality standards.
- Ogun State Environmental Protection Laws and Regulations – provide state-level environmental compliance requirements relating to pollution control, waste management, environmental sanitation, and the safe handling/disposal of hazardous substances within Ogun State.

- National Agency for Food and Drug Administration and Control (NAFDAC) Act (Cap N1 LFN 2004) – regulates registration, importation, distribution, sale, and use of pesticide products in Nigeria.
- National Biosecurity Policy and Action Plan (2022–2026) – promotes surveillance-based and integrated pest management systems.
- Pest Control of Produce (Special Powers) Act (1968) – addresses pest inspection and control of agricultural produce for domestic consumption and export.
- Factories Act (Cap F1 LFN 2004) – regulates occupational health and safety in industrial facilities, including pesticide handling, storage, and worker protection.
- International conventions and good practice, including the FAO/WHO International Code of Conduct on Pesticide Management and conventions restricting Persistent Organic Pollutants (POPs).

Institutional coordination for PMP implementation under the Ogun SAPZ is embedded within state-level structures and SAPZ governance arrangements, ensuring that pest management is integrated into agro-industrial development, value chain operations, and environmental safeguards compliance.

3.3 Institutional Roles and Responsibilities

1. **Ogun State Ministry of Agriculture and Food Security (MoAFS)**

Core Function: Lead technical institution for crop production and IPM implementation under the Ogun SAPZ.

Key Responsibilities:

- Develop and operationalize IPM strategies for SAPZ crops of interest (cassava, cocoa, oil palm, and timber/wood-related produce).
- Supervise pest surveillance activities across Agro-Transformation Centres (ATCs) and the Agro-Industrial Hub (AIH).
- Promote the use of pest-resistant planting materials and good agricultural practices.
- Coordinate with registered agro-dealers to ensure availability and use of NAFDAC-approved pesticides only.

AfDB Safeguard Linkage: OS1, OS3, OS4, OS6

2. **Ogun State Ministry of Environment (MoE)**

Core Function: Environmental oversight and regulatory enforcement.

Key Responsibilities:

- Monitor environmental risks associated with pesticide use, including soil, surface water, and groundwater contamination.

- Enforce compliance with national environmental regulations and AfDB OS3 and OS4.
- Oversee safe pesticide storage, waste management, container disposal, and hazardous materials handling.
- Participate in periodic environmental audits of PMP implementation.

AfDB Safeguard Linkage: OS1, OS3, OS4, OS6

3. Ogun State Agricultural Development Programme (OGADEP)

Core Function: Extension services, farmer capacity development, and field-level IPM delivery.

Key Responsibilities:

- Organize Farmer Field Schools (FFS) and Training-of-Trainers (ToT) programmes on IPM.
- Conduct pest scouting, early warning reporting, and farmer advisory services.
- Facilitate adoption of non-chemical and low-risk pest control methods.
- Support women, youth, and vulnerable farmers in IPM adoption.

AfDB Safeguard Linkage: OS1, OS2, OS4, OS10

4. Ogun SAPZ Project Coordination Unit (PCU) / Steering Committee

Core Function:

Strategic oversight, coordination, and safeguards compliance.

Composition:

- Ogun MoAFS
- Ogun Ministry of Environment
- OGADEP
- SAPZ PCU
- AIH/ATC Operators
- Farmer Cooperatives / Private Investors

Key Responsibilities:

- Coordinate PMP implementation across SAPZ sites.
- Review safeguards performance and compliance with AfDB ISS.
- Ensure alignment of pest management practices with agro-industrial operations.
- Facilitate reporting to AfDB and engagement with development partners.

AfDB Safeguard Linkage: OS1, OS10

5. National Agricultural Quarantine Service (NAQS)

Core Function: Federal agency responsible for plant quarantine, pest exclusion, phytosanitary control, and prevention of the introduction/spread of regulated pests and diseases in Nigeria.

Key Responsibilities:

- Monitor and enforce compliance with national phytosanitary and quarantine requirements relating to agricultural produce and planting materials.
- Conduct pest surveillance, inspection, and quarantine control to prevent the spread of invasive pests and transboundary plant diseases.
- Provide technical guidance on regulated pest management and phytosanitary standards applicable to agricultural production and storage systems.
- Collaborate with Ogun SAPZ stakeholders to strengthen pest surveillance, early warning systems, and biosecurity measures across the ATCs and AIH.

AfDB Safeguard Linkage: OS1, OS3, OS4, OS6

6. National Agency for Food and Drug Administration and Control (NAFDAC)

Core Function: Regulatory authority responsible for the registration, regulation, and control of pesticides and agrochemical products in Nigeria.

Key Responsibilities:

- Regulate the registration, importation, manufacture, distribution, sale, and use of pesticides and agrochemical products in Nigeria.
- Ensure that only approved and certified pesticide products are used within the Ogun SAPZ Project.
- Monitor compliance with pesticide labeling, packaging, storage, and handling standards.
- Provide regulatory oversight on pesticide quality assurance and withdrawal of banned/restricted chemicals from circulation.

AfDB Safeguard Linkage: OS1, OS3, OS4, OS6

7. National Environmental Standards and Regulations Enforcement Agency (NESREA)

Core Function: National agency responsible for enforcement of environmental laws, standards, and regulations relating to hazardous substances and environmental pollution control.

Key Responsibilities:

- Enforce compliance with national environmental standards relating to pesticide storage, handling, transportation, and disposal.
- Monitor environmental pollution risks associated with agrochemical use and hazardous waste generation.
- Ensure proper disposal and management of pesticide containers and agrochemical-related wastes.
- Support environmental compliance audits and enforcement actions relating to pest management practices under the Ogun SAPZ.

AfDB Safeguard Linkage: OS1, OS4, OS6

3.4 Institutional Coordination Mechanism

Implementation of the PMP relies on structured coordination, data sharing, and decision-making mechanisms, including:

- Monthly site-level technical meetings involving extension officers, ATC operators, and cooperatives.
- Quarterly state-level coordination meetings chaired by the SAPZ PCU.
- Central PMP Monitoring and Reporting System to document pest incidence, pesticide use, and IPM performance.

3.4.1 Reporting Flow:

Farmers / IPM Scouts → OGADEP Extension Officers → MoAFS & MoE → SAPZ PCU / Steering Committee → AfDB

This framework supports early detection of pest risks, regulatory oversight, and timely corrective actions in line with AfDB safeguards.

3.5 Capacity Building and Institutional Strengthening

A preliminary needs assessment identified gaps in IPM knowledge, pesticide stewardship, environmental monitoring, and record-keeping among key stakeholders.

Capacity Building Focus Areas:

- Extension Staff: Advanced IPM tools, pest threshold analysis, pesticide risk communication, vector surveillance and control strategies, and safeguards reporting. Farmers and Cooperatives: Pest identification, non-chemical control methods, safe pesticide handling, PPE use, and container disposal.
- ATC Operators: Chemical storage standards, waste management, occupational safety, and emergency response.

Targeted training programmes will be implemented throughout the SAPZ lifecycle to ensure institutional sustainability of IPM practices.

Table 3.1 Institutional Organizational Structure

Level	Institution	Key PMP Role
Federal	FMEnv / NESREA	National environmental policy oversight, environmental standards enforcement, hazardous waste and pollution control
Federal	NAFDAC	Pesticide regulation, registration, importation control, and agrochemical approval
Federal	NAQS	Plant quarantine, phytosanitary inspection, pest surveillance, and biosecurity enforcement
State	Ogun MoAFS	IPM leadership, pest surveillance, extension coordination
State	Ogun Ministry of Environment / OGEPA	Environmental monitoring, compliance enforcement
State	OGADEP	Farmer training, IPM delivery, field data collection
SAPZ	SAPZ PCU / Steering Committee	Coordination, safeguards oversight, AfDB reporting
Site	AIH & ATC Operators	Safe chemical use, storage, and site-level compliance
Community	Farmers & Cooperatives	IPM adoption, pest reporting, safe handling

Institution / Actor	OS1	OS2	OS3	OS4	OS5	OS6	OS8	OS10
Ogun MoAFS	✓		✓	✓	✓	✓		✓
Ogun Ministry of Environment	✓		✓	✓	✓	✓		
OGADEP	✓	✓		✓		✓		✓
SAPZ PCU / Steering Committee	✓						✓	

AIH / ATC Operators	✓	✓	✓	✓	✓		✓	
Farmers & Cooperatives	✓	✓		✓		✓		✓

3.5.1 Workshops and Field Demonstrations

Workshops and field-based demonstrations will serve as the primary vehicles for building institutional and community-level capacity for Integrated Pest Management (IPM) under the Ogun State SAPZ. These activities will focus on the practical application of IPM principles and Standard Operating Procedures (SOPs), including the proper use of Personal Protective Equipment (PPE), safe handling and storage of pesticides, post-harvest pest management, and the use of mobile- and digital-based pest surveillance tools.

Capacity building is recognized as a critical pillar for the long-term sustainability of IPM implementation within the Agricultural-Transformation Centres (ATCs) and the Agro-Industrial Hub (AIH). Accordingly, training interventions are designed to be inclusive, phased across the project lifecycle, and targeted at different actor groups across the value chain—farmers, extension agents, youth, warehouse operators, licensed service providers, and project oversight institutions. Emphasis is placed on participatory learning approaches, including Farmer Field Schools (FFS), hands-on demonstrations, peer learning, and Training-of-Trainers (ToT) models, in line with AfDB good international industry practice.

Details of the proposed IPM capacity-building programme, beneficiary groups, implementation phases, and indicative costs are presented in Table 3.3.

Table 3.3: Capacity Building Programme for IPM Implementation (Ogun SAPZ)

Beneficiary Group	Capacity-Building / Training Activity	Project Phase	Estimated Cost (₦)	USD Equivalent (@₦1,450/USD)
Smallholder Farmers (men and women across project wards)	Farmer Field Schools (FFS) on IPM principles, safe pesticide use, hermetic storage techniques, and biological control methods	Pre-construction & Operation	2,500,000	1,724.14
ADP Extension Agents (OGADEP – approx. 30 officers)	Training-of-Trainers (ToT) on pest scouting, surveillance methods, reporting protocols, and emergency response	Pre-construction	1,800,000	1,241.38
Youth IPM Scouts (approx. 20 persons)	Practical training on pest scouting, digital reporting tools,	Construction & Operation	1,200,000	827.59

	PPE usage, and community-level surveillance			
AIH Warehouse and Storage Facility Managers	Post-harvest pest management, fumigation SOPs, inventory control, and record keeping	Operation	1,000,000	689.66
Licensed Fumigation Service Providers	Safe fumigation techniques (including phosphine use), exposure risk management, and emergency response procedures	Operation	1,500,000	1,034.48
Community Focal Persons / GRM Desk Officers	Gender- and youth-responsive pest management, community awareness, and grievance redress mechanisms	All Phases	900,000	620.69
Women and Youth Associations	IPM-related entrepreneurship, bio-control agent production, and value addition opportunities	Operation	1,300,000	896.55
SAPZ Steering Committee & Local Government Officials	Institutional oversight of IPM compliance, safeguards coordination, and use of PMP monitoring/dashboard tools	Pre-construction & Construction	800,000	551.72
Total			11,000,000	7,586.21

1USD = ₦1,450 as at December 2025

SECTION 4: PEST ASSESSMENT AND SURVEILLANCE

4.1 Introduction

Effective pest management for the proposed Agro-Transformation Centres (ATCs) at Imasayi-Sawonjo and Iwaya, Ijebu-itele in Ogun State requires a structured system for early pest detection, continuous surveillance, and evidence-based decision-making. This chapter presents the pest risk assessment and surveillance framework developed for the priority crops identified under the Ogun SAPZ Programme, namely cassava, rice, cocoa, oil palm, and timber/wood produce.

The assessment focuses on both production-level (farm) and aggregation/processing-level (ATC) pest risks, recognising that poor pest control at either stage may undermine productivity, food safety, occupational health, and environmental sustainability. The approach follows AfDB Integrated Pest Management (IPM) principles and draws on relevant FAO and IPPC guidance, while remaining consistent with national agricultural and biosecurity regulations.

4.2 Crop-Specific Pest Profiles

Each priority crop associated with the proposed Ogun SAPZ ATCs has distinct pest and disease pressures across its production, aggregation, storage, and transport value chain. Surveillance efforts will therefore be tailored to the biology of each crop and its predominant pest/vector risks, consistent with the pest profile established in Section 2 (Table 2.5). Table 4.1 summarises the major field, vector, and storage pests requiring routine monitoring.

4.2.1 Cassava (*Manihot esculenta*)

Cassava is a key staple and industrial crop within the Ogun SAPZ. The primary pest risks include:

- **Cassava green mite** (*Mononychellus tanajoa*), which causes leaf chlorosis, reduced photosynthesis, and yield loss, particularly under dry-season conditions;
- **Cassava mealybug** (*Phenacoccus manihoti*), which leads to stunted growth and leaf deformation;
- **Whiteflies** (*Bemisia tabaci*), which serve as vectors of Cassava Mosaic Disease and may significantly affect crop productivity;
- **Termites**, which damage cassava stems and root structures, particularly in dry soils;
- **Rodents**, which may damage harvestable roots during field drying and storage at aggregation points.

Surveillance will focus on planting material inspection, vegetative-stage field scouting, and inspections at cassava root handling and temporary storage areas within the ATC.

4.2.2 Cocoa (*Theobroma cacao*)

Cocoa remains a high-value perennial crop linked to processing and aggregation activities under Ogun SAPZ. Major pest threats include:

- Cocoa mirids (capsids), which damage pods and shoots and significantly reduce yields if unmanaged;
- Black pod disease (*Phytophthora spp.*), which affects pod quality and productivity;
- Stem canker, which affects tree health and longevity;
- Pod borers, which damage developing cocoa pods;
- Secondary storage pests, including beetles and moths, which may infest dried beans if storage hygiene is poor.

Surveillance will prioritise pod development and harvest stages at farm level, as well as hygiene and fumigation practices at cocoa aggregation and storage points.

4.2.3 Oil Palm (*Elaeis guineensis*)

Oil palm production and processing present unique pest challenges, particularly where fresh fruit bunches (FFB) are aggregated at ATCs. Key pests include:

- African palm weevil (*Rhynchophorus spp.*), which damages stems and affects palm structural integrity;
- Rhinoceros beetle (*Oryctes spp.*), which damages young palms and reduces stand vigour;
- Fungal bud and spear rot, which affects developing palm shoots and plantation establishment;
- Rodents, which may infest palm fruit storage and processing areas.

Surveillance will cover nursery and immature plantation stages, as well as ATC handling, processing, and waste zones where pests may proliferate.

4.2.4 Rice (*Oryza sativa*)

Rice production within the Ogun SAPZ is vulnerable to multiple field and post-harvest pests, including:

- Rice stem borers, which damage stems and reduce grain filling;
- Rice leaf folders, which reduce leaf area and photosynthetic efficiency;
- Planthoppers, which affect plant vigour and may transmit diseases;

- Rice blast (*Magnaporthe oryzae*) and bacterial leaf blight, which affect crop yield and quality;
- Birds and rodents, which damage grains during maturity, harvest, and storage.

Surveillance will focus on nursery establishment, tillering and flowering stages, and moisture-controlled storage conditions.

4.2.5 Timber / Wood Produce

Timber and wood products linked to agro-forestry activities under Ogun SAPZ face significant post-harvest pest risks, including:

- Termites, which compromise wood integrity during storage;
- Powder-post beetles and wood borers, which damage sawn timber and processed wood products;
- Fungal decay organisms, which degrade wood quality during poor storage or seasoning.

Surveillance will focus primarily on post-harvest and storage environments, including ATC timber yards, warehouses, and processing units.

Table 4.1: Priority Crops and Key Pests for Ogun SAPZ ATCs (Imasayi-Sawonjo and Iwaya)

Crop of Interest	Major Field Pests / Vectors	Storage Pests / Post-Harvest Risks	Critical Control Stage
Cassava	Cassava green mite, cassava mealybug, whiteflies, termites	Rodents, root rot pathogens	Vegetative growth; root handling and storage
Rice	Rice stem borers, rice leaf folders, planthoppers, birds	Rodents, mould/insect infestation	Nursery establishment; tillering and flowering stages; harvesting and storage
Cocoa	Cocoa mirids, black pod disease, stem canker, pod borers	Beetles, moths	Pod development, harvest, bean fermentation and storage

Oil Palm	African palm weevil, rhinoceros beetle, fungal bud/spear rot	Rodents	Nursery and immature palms; FFB handling
Timber / Wood Produce	Termites	Wood borers, fungal decay organisms	Post-harvest processing and storage

4.3 Surveillance Strategy

The surveillance strategy for the Ogun SAPZ ATCs is designed to ensure early warning, rapid response, and regulatory compliance across both production zones and ATC facilities.

Objectives

The surveillance system aims to:

- Detect pest infestations early across priority crops and value-chain stages;
- Monitor pest population trends to guide IPM interventions;
- Provide verifiable data for environmental, health, and safety oversight under the PMP.

Surveillance Methods

- Field scouting and inspections: Regular visual inspections and standardized sampling by trained extension agents and youth IPM scouts.
- Traps and monitoring devices: Deployment of pheromone and bait traps where relevant (e.g., beetles, rodents).
- Damage assessment and thresholds: Application of crop-appropriate economic thresholds to inform intervention decisions.
- Community-based reporting: Input from farmer groups and ATC operators through simple mobile communication channels.

Roles and Responsibilities

- Ogun State Ministry of Agriculture / ADP: Technical leadership, protocol development, and data quality assurance.
- ATC Environmental, Health and Safety (EHS) Officer: Site-level coordination, data collation, and reporting.
- Extension Agents and Youth IPM Scouts: Routine scouting and first-line reporting.
- Farmer Cooperatives and ATC Operators: Notification of abnormal pest incidents and collaboration during inspections.

Timing and Frequency

- Pre-construction phase: Baseline pest surveys, training, and establishment of surveillance infrastructure.
- Construction phase: Monitoring of pest risks associated with land clearing, materials storage, and waste management.
- Operation phase:
 - Regular field surveillance aligned with cropping calendars;
 - Monthly inspections of ATC storage and processing facilities;
 - Annual review and refinement of surveillance thresholds and methods.

Data Management and Linkage to IPM

All surveillance data will be consolidated by the ATC EHS Officer and reported through the PMP monitoring system. Findings will directly inform non-chemical, biological, and chemical control measures, ensuring that interventions remain proportionate, environmentally sound, and consistent with AfDB IPM requirements.

4.4 Pest Risk Mapping

Pest prevalence within the Ogun SAPZ intervention areas was found to be spatially variable across farming communities supplying produce to the proposed Imasayi-Sawonjo and Iwaya (Ijebu East) Agricultural Transformation Centres (ATCs). Given the low reliance on GIS-based spatial datasets, pest risk mapping was undertaken using a field-based and participatory assessment approach, consistent with FAO and AfDB Integrated Pest Management (IPM) guidance for data-constrained environments.

The assessment combined historical extension records, structured field observations, stakeholder consultations, and seasonal cropping patterns to identify zones of relatively higher pest pressure and vulnerability within the ATC catchment areas.

4.4.1 Hotspot Identification

Pest “hotspots” were identified through the integration of the following information sources:

- Historical pest incidence records obtained from Ogun State Agricultural Development Programme (ADP) extension officers at respective locations, reflecting recurring pest challenges affecting cassava, cocoa, oil palm, and stored wood products within the intervention areas.
- Seasonal crop calendars for the dominant crops, highlighting periods of heightened pest vulnerability during vegetative growth, fruit development, and post-harvest storage.

- Systematic farm and storage inspections, during which recurrent damage symptoms, poor field sanitation, and storage-related infestations were documented.
- Community consultations and focus group discussions, during which farmers and cooperative leaders confirmed locations experiencing repeated pest pressure over multiple seasons.

These combined inputs enabled the delineation of relative pest risk zones within both ATC catchments with limited reliance on satellite imagery or digital spatial tools.

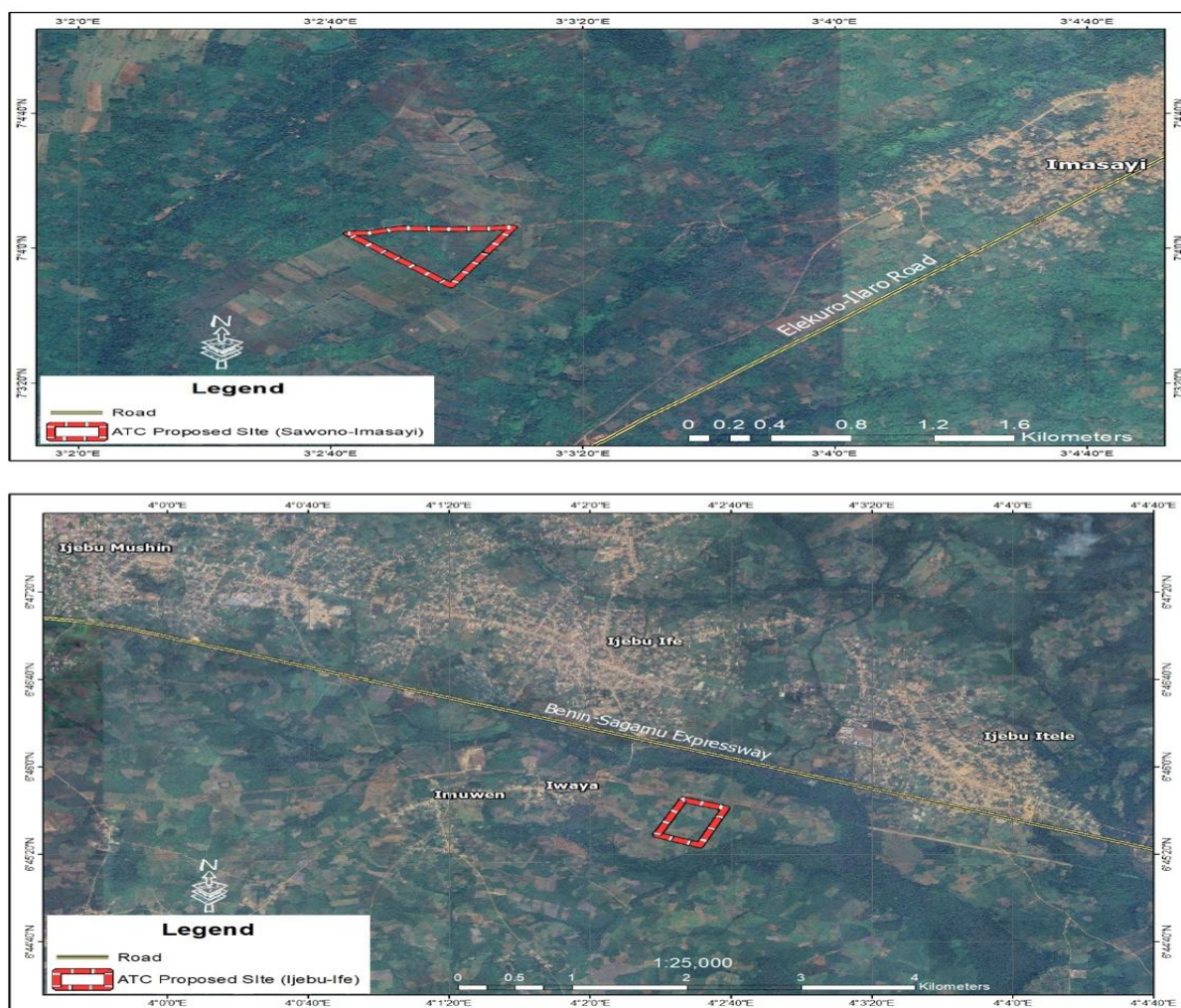


Figure 3: Satellite Imagery of the proposed ATC at Sawonjo-Imasayi & Iwaya, Ijebu East Showing Major Landmarks

4.4.2 Pest Risk Prioritization Matrix

A qualitative pest risk prioritization matrix was developed and applied to rank observed pest pressure by crop and location. Risk categories were determined based on pest frequency, severity of observed damage, and economic relevance of the affected crop.

Table 4.2: Pest Risk Prioritization Matrix for Ogun SAPZ ATCs

ATC Catchment Area	Crop	Observed Pest Pressure	Risk Category	Action Priority
Imasayi-Sawonjo	Cassava	Recurrent mite and mealybug damage	High	Immediate IPM response
Imasayi-Sawonjo	Rice	Stem borer, bird, rodent, and fungal disease occurrence during cultivation and storage	Medium-High	Enhanced surveillance and targeted IPM measures
Iwaya (Ijebu East)	Cocoa	Seasonal mirid infestation	Medium	Routine monitoring
Iwaya (Ijebu East)	Oil Palm	Beetle and rodent activity	Medium	Targeted control
Iwaya (Ijebu East)	Timber / Wood Produce	Termite and wood borer infestation in storage	High	Immediate preventive measures

This matrix above, serves as the basis for prioritising pest management actions and allocating surveillance effort across the two ATC sites.

4.4.3 Linkage with ATC Operations

Findings from the pest risk mapping were integrated into planned ATC operational arrangements. Harvest scheduling, post-harvest handling, and storage management protocols were aligned with identified periods and locations of heightened pest pressure. This integration was specifically applied to cassava aggregation points, cocoa drying and storage areas, oil palm handling zones, and timber storage facilities to reduce infestation risks and post-harvest losses.

4.5 Pest Detection and Surveillance

Pest detection within the Ogun SAPZ ATC catchments was undertaken using a ground-based surveillance system, recognising the limitation of a real time GIS and remote sensing data. The adopted system relies on field inspections, extension-led monitoring, and community-based reporting, which are established practices within Ogun State's extension framework.

4.5.1 Surveillance Methodology

The surveillance process followed a structured and repeatable methodology:

1. Routine field inspections were conducted by extension officers and trained community-based youth monitors across cassava, cocoa, rice, and oil palm farms within the proposed ATCs.
2. Visual assessments were used to document pest presence, crop damage symptoms, and environmental conditions contributing to pest proliferation.
3. Standardised observation sheets were used to record pest occurrence and severity.
4. ATC storage inspections were undertaken to identify termite, borer, rodent and other storage pest activity in timber and other stored produce.
5. Pest surveillance data and field observations were compiled and reviewed monthly by field officers at ward and ATC levels to monitor infestation trends, evaluate pest risk patterns, and inform timely intervention measures.

4.6 Data Sources and Surveillance Tools

The following data sources and tools were applied during the assessment:

- Ogun State ADP extension records and pest advisory reports
- Farmer group and cooperative pest logs
- Field inspection checklists and pest identification guides
- Mobile phone-based reporting (SMS, WhatsApp) between farmers and extension officers

4.7 Site Vulnerability to Pest Infestation

The assessment established that both Imasayi-Sawonjo and Iwaya, Ijebu-Itele ATC catchments exhibit moderate to high vulnerability to pest infestation if Integrated Pest Management measures are not effectively applied. Contributing factors identified during field assessments include continuous cropping systems, favourable climatic conditions for pest proliferation, and limitations in on-farm and communal storage infrastructure.

Rather than numerical and unavailable real time GIS-based vulnerability maps, the study adopted crop-specific qualitative vulnerability profiles, summarised below.

Table 4.3 Crop Vulnerability Summary
Table 4.3: Crop and Vector Vulnerability Summary

Crop / Exposure Category	Vulnerability Level	Key Observed Risk
Cassava	High	Vegetative pests and post-harvest deterioration
Cocoa	Medium-High	Mirid damage and storage hygiene challenges
Oil Palm	Medium	Insect and rodent damage
Rice	Medium-High	Field pest pressure, bird and rodent attacks, and post-harvest losses due to inadequate drying and storage
Timber / Wood Produce	High	Termite and borer infestation during storage
Construction and Operational Areas (Vector Exposure)	Medium-High	Mosquito breeding in stagnant water, increased malaria/vector-borne disease risk to workers and surrounding communities

4.8 Conclusion

The pest risk mapping and surveillance assessment carried out for the Ogun SAPZ confirmed that pest pressure is a material constraint across the ATC supply catchments. Through field-based analysis, participatory validation, and structured prioritisation, the PMP establishes a realistic, evidence-based framework for pest monitoring and control. The adopted approach satisfies AfDB Integrated Pest Management requirements, strengthens decision-making at the ATC level, and supports sustainable agro-industrial operations without reliance on advanced geospatial tools.

SECTION 5:

EXISTING CONTROLS AND NATURE-BASED SOLUTION FOR PEST MANAGEMENT

5.1 Introduction

The sustainability of agricultural supply chains supporting the proposed Agricultural Transformation Centres (ATCs) at Imasayi-Sawonjo and Iwaya/Ijebu Itele (Ijebu East) under the Ogun State SAPZ is dependent on pest management systems that protect crop yield and product quality while minimizing risks to human health and the environment. The intervention areas fall within the humid forest and derived savannah agro-ecological zones of Ogun State, where farming communities have historically relied on a combination of cultural practices, biological controls, and limited chemical inputs for pest management.

Field assessments, consultations with farmers and extension officers, and review of Ogun State ADP practices confirmed that a range of existing biological pest control (BPC) measures and nature-based solutions (NBS) are already in use across cassava, rice, cocoa, oil palm, and timber/wood production systems. These practices provided a practical foundation for the Pest Management Plan (PMP), allowing it to be structured around locally proven and socially accepted methods, rather than introducing untested approaches.

5.2 Existing Pest Management Practices in Ogun State and Comparable Ecologies

Across the Imasayi-Sawonjo and Iwaya/Ijebu Itele catchment areas, other than the chemical use, farmers were observed to employ low-cost and environmentally benign pest management practices, shaped by local experience and extension support.

Rice farmers commonly adopt timely land preparation, synchronized planting, and field sanitation practices, including removal of volunteer plants and infested tillers, which help break pest life cycles. Water management through controlled flooding and drainage was observed to reduce the incidence of rice stem borers and weeds. Farmers also rely on natural predators supported by bund vegetation and surrounding wetlands, while the use of tolerant or improved rice varieties promoted by extension services contributes to reduced pest pressure.

Cassava farmers commonly practice intercropping, early harvesting of mature tubers, and selection of tolerant or improved planting materials, which limit the build-up of common pests such as mites and mealybugs. These practices are widely supported by Ogun State ADP extension messaging.

Oil palm producers rely largely on field sanitation, controlled weed management, and manual removal of affected fronds and bunches to suppress beetles and rodents. In some locations, farmers were observed using botanical preparations, including neem-based extracts, as deterrents.

For timber and wood produce, particularly during storage and aggregation, elevated stacking, moisture control, regular inspection, and physical separation from soil contact were identified as key measures used to reduce termite and wood-borer damage.

In cocoa-producing communities, manual pruning, canopy regulation, removal of infested pods, and retention of shade trees were observed as standard practices for reducing mild pressure and maintaining orchard health. These measures also support populations of natural enemies such as ants and predatory insects.

These practices demonstrate that the pest management measures incorporated into the PMP reflect existing, functional systems already operating within Ogun State, and therefore present minimal adoption risk.

5.3 Biological Pest Control and Nature-Based Solutions by Crop

Cassava (*Manihot esculenta*)

Existing biological and nature-based controls investigated and observed include intercropping with cereals, removal of infested plant material, and reliance on naturally occurring predators of cassava mites and mealybugs. The PMP builds upon these measures by formalising surveillance routines and reinforcing the use of tolerant planting materials distributed through extension channels.

Rice (*Oryza sativa*)

For rice production systems associated with the project, existing biological and nature-based pest control measures include timely land preparation, synchronized planting, field sanitation, and water management practices that disrupt pest life cycles. The presence of natural enemies such as predatory insects and amphibians was observed, supported by reduced chemical use and maintenance of field bund vegetation. Farmers also employ manual removal of egg masses and infested tillers, particularly for stem borers and leaf folders. The PMP strengthens these practices by promoting integrated rice field management, enhanced monitoring of pest thresholds, conservation of beneficial organisms, and the use of pest-tolerant rice varieties disseminated through extension services.

Cocoa (*Theobroma cacao*)

In cocoa systems supplying the proposed ATCs, pruning, sanitation, and shade management were identified as primary non-chemical pest control measures. These practices reduce mirid infestation, improve airflow within plantations, and limit pest

establishment. In addition, biological and nature-based solutions for the management of **black pod disease (*Phytophthora spp.*)** include regular removal and destruction of infected pods, maintenance of proper field sanitation, improved drainage to reduce excess field moisture, strategic canopy thinning to reduce humidity, and the application of organic mulch and approved biological control agents where feasible to suppress fungal development. The PMP consolidates these measures by integrating them into seasonal farm management schedules and extension advisory services.

Oil Palm (*Elaeis guineensis*)

Observed pest management practices included routine clearing of debris, manual control of visible infestations, and protection of beneficial organisms within plantations. The maintenance of ground cover vegetation was also noted to support natural pest regulation while reducing erosion. These measures are retained and strengthened under the PMP.

Timber / Wood Produce

For timber and wood products, pest control relies predominantly on preventive and non-chemical interventions, including proper seasoning, raised storage platforms, routine inspection, and exclusion of moisture. These practices were documented during storage assessments and are maintained as core PMP measures to manage termites and wood-boring insects. In addition, biological and nature-based control options such as the application of entomopathogenic fungi (e.g., *Metarhizium spp.* and *Beauveria bassiana*), use of botanical wood preservatives, and deployment of termite baiting systems using biologically active agents may be adopted where feasible to supplement physical controls and reduce reliance on chemical wood treatments.

5.4 Landscape-Level Nature-Based Solutions

Beyond individual farm plots, broader **landscape-level nature-based solutions** were identified in the project areas. These include the preservation of tree cover, vegetated boundaries, and mixed-cropping systems that support pollinators and natural enemies of crop pests. Such features also contribute to soil stability and reduced pest migration between fields.

At the ATC planning level, these existing landscape elements have been acknowledged and incorporated into land-use considerations to avoid unnecessary clearing and to maintain ecological functions that support natural pest regulation.

5.5 Integration into the PMP Operational Framework

The documented BPC and NBS measures have been fully integrated into the PMP operational framework applied to the Ogun SAPZ ATCs through the following mechanisms:

- Surveillance: Routine field and storage inspections conducted by extension officers and trained community monitors form the first line of pest detection.
- Threshold-based action: Cultural and biological control measures are applied as first-response options once pest presence exceeds locally accepted tolerance levels.
- Demonstration and reinforcement: Existing good practices observed in the project areas are reinforced through extension advice, on-farm demonstrations, and peer learning rather than replaced with unfamiliar methods.
- Supportive inputs: Where necessary, the PMP provides access to approved biopesticides, botanical treatments, and improved storage practices to complement existing controls.

Through this approach, pest management under the Ogun SAPZ PMP is grounded in documented local practice, nature-based solutions, and adaptive management, ensuring environmental sustainability, regulatory compliance, and long-term adoption by farmers and ATC operators.

5.6 Benefits and Practicability

The pest management measures adopted under the Ogun SAPZ Pest Management Plan were assessed to be practical, locally appropriate, and technically feasible, as they are grounded in existing agricultural practices and experiences within Nigeria. The measures do not rely on high technology or imported inputs; rather, they are implemented using locally available materials, existing extension structures, and community labour within the Imasayi-Sawonjo and Iwaya/Ijebu Itale ATC catchment areas.

By integrating these controls into routine farm management, aggregation, storage, and post-harvest handling operations, the PMP delivers multiple documented benefits. These include reduced dependence on chemical pesticides, lower pesticide residue risks in produce, improved occupational health and safety for farmers and handlers, enhanced on-farm biodiversity, and reduced production and storage costs. The approach also supports more stable production volumes and improved product quality for cassava, rice, cocoa, oil palm, and timber/wood produce supplied to the ATCs.

The Ogun SAPZ Pest Management Plan does not introduce untested or experimental methods. Instead, it systematically organises existing biological pest control measures and nature-based solutions—already proven under Nigeria’s agro-ecological conditions—into a coordinated, funded, and monitored framework. This consolidation strengthens consistency in application, enables effective supervision, and supports measurable performance tracking.

Overall, the adopted approach provides a balanced pest management system that achieves effective pest suppression while upholding environmental protection and social safeguards. It is fully aligned with African Development Bank safeguard requirements,

Nigeria's agricultural and environmental policies, and the long-term sustainability objectives of the Ogun State SAPZ, ensuring that pest management at the ATC level remains cost-effective, scalable, and locally sustainable.



Plate 5.1 Farmer Applying Agrochemical on Cassava Farmland Using a Backpack Sprayer at Imasayi Proposed ATC Sites

SECTION 6: REGULATORY AND INSTITUTIONAL FRAMEWORK FOR CHEMICAL PEST MANAGEMENT

6.1 Introduction

The Pest Management Plan (PMP) for the proposed Agricultural Transformation Centre (ATC) under the Ogun State Special Agro-Industrial Processing Zones (SAPZ) emphasises the primacy of biological pest control practices and nature-based solutions. Nevertheless, evidence from field assessments and extension records confirms that limited and controlled use of chemical pest control inputs remains necessary to address specific pest pressures affecting cassava, rice, cocoa, oil palm and timber/wood products in the Imasayi-Sawonjo and Iwaya /Ijebu Itele catchments.

This chapter assesses Nigeria's existing regulatory framework, institutional arrangements, agricultural extension services, and agri-input supply chains as they relate to safe and responsible pesticide use within the PMP. The analysis identifies strengths, capacity gaps and operational risks, and demonstrates how PMP measures at ATC level provide effective supplementary controls. The chapter is fully aligned with **AfDB Operational Safeguard 4 (Pollution Prevention and Control)**, as well as **OS1, OS3, and OS5**, and reflects conditions currently observed in Ogun State, particularly in relation to pesticide handling, occupational health and safety, PPE requirements, and worker protection during implementation activities.

6.2 Registration and Regulation of Phytopharmaceuticals

6.2.1 Existing Regulatory Framework

Nigeria maintains a national system for the registration, classification and oversight of pesticide products. The National Agency for Food and Drug Administration and Control (NAFDAC) acts as the primary authority responsible for evaluating pesticide dossiers, approving active ingredients and formulations, and issuing market authorisations. Complementary policy oversight is provided by the Federal Ministry of Agriculture and Food Security (FMAFS) and the Federal Ministry of Environment (FMEnv), particularly with respect to maximum residue limits, environmental protection and disposal of hazardous substances. The **National Agricultural Quarantine Service (NAQS)** also plays a critical regulatory role in plant pest quarantine, import/export inspections, phytosanitary certification, and the prevention of transboundary pest and disease introduction into Nigeria's agricultural systems. Enforcement of environmental controls and chemical waste regulations falls under the mandate of **NESREA**.

Research and technical institutions, including NAERLS and crop-specific research centres such as CRIN, NIFOR, NRCRI support the regulatory process by generating efficacy, toxicity, and residue data used in pesticide approvals. In addition, Nigeria's pesticide

regulatory framework is guided by its obligations under key international environmental agreements, including the Stockholm Convention on Persistent Organic Pollutants (POPs), which regulates the elimination and restriction of hazardous persistent chemicals, and the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, which promotes shared responsibility and information exchange regarding the importation and use of hazardous chemicals and pesticide products.

6.2.2 Relevance to the Proposed ATC

This regulatory framework provides a functional basis to ensure that only approved and lower-risk phytopharmaceuticals are used within the ATC supply chain. Field consultations in Imasayi–Sawonjo and Iwaya/Ijebu Itele confirm that registered products are available in local markets, although often alongside informal or counterfeit alternatives.

The PMP therefore relies on the existing regulatory system while reinforcing it through ATC-level input screening, enabling exclusion of Highly Hazardous Pesticides (HHPs) and reducing the risk of residue exceedances in processed commodities.

6.2.3 Capacity Gaps and Risks

Despite the presence of a national regulatory system, several constraints affect local effectiveness:

- Delays in re-registration create persistence of obsolete products in circulation;
- Weak border and market surveillance increase the risk of counterfeit inputs;
- Limited laboratory capacity constrains residue testing throughput;
- Smallholder farmers often lack full label comprehension.

These constraints underscore the need for project-embedded controls rather than reliance on national enforcement alone.

6.3 Agricultural Extension Services

6.3.1 Existing Extension Structure

Agricultural extension services in Ogun State are delivered primarily through the Ogun State Agricultural Development Programme (OGADEP), operating via zonal and block offices. OGADEP maintains an active presence in both Ijebu East and Yewa North LGAs and has long-standing engagement with cassava, rice, cocoa and oil palm farmers.

Field consultations, key informant interviews, and stakeholder engagement conducted during the baseline assessment indicate that extension agents possess practical contextual knowledge of pest dynamics and farmer practices, particularly in relation to cassava and cocoa production systems within the Ogun SAPZ catchment areas.

6.3.2 Strengths and Limitations

The extension system provides an important platform for IPM dissemination and coordination; however, effectiveness is constrained by:

- High extension-agent-to-farmer ratios;
- Limited refresher training on pesticide stewardship, PPE use and calibration;
- Uneven access to digital tools for surveillance and reporting.

These limitations affect the consistency of pest-management messaging and the monitoring of chemical use at farm level.

6.3.3 PMP Integration

The PMP integrates existing extension structures through community-level IPM focal persons, linked to OGADEP, to strengthen field presence and improve feedback. This approach builds on current arrangements rather than duplicating them, improving coverage while maintaining institutional continuity.

6.4 Phytopharmaceutical Supply Chains and Market Controls

6.4.1 Market Structure

Agri-inputs in the ATC catchment areas are supplied through a mixed system of formal distributors, registered agro-dealers and informal vendors. Field observations indicate that many smallholders procure agrochemical products from roadside sellers or open markets where traceability is limited, including commonly used herbicides, insecticides, fungicides, and other pesticide formulations for routine farm pest and weed control.

6.4.2 Identified Risks

Key risks associated with current supply chains include:

- Presence of counterfeit or mislabelled products;
- Limited agro-dealer knowledge of IPM principles;
- Weak farmer awareness of permitted versus prohibited products.

These risks undermine both farmer safety and compliance with AfDB standards.

6.4.3 PMP Mitigation Measures

The PMP mitigates these risks through approved input guidance, farmer sensitization, and preferential engagement with identifiable agro-dealers. These measures enhance input quality control without disrupting existing market systems.

6.5 Monitoring, Enforcement and Feedback Systems

Existing national monitoring mechanisms rely on periodic inspections, sporadic residue testing and complaint-based enforcement. In Ogun State, resource limitations restrict inspection coverage and laboratory testing frequency, and farmers rarely receive feedback from controls carried out.

To address these gaps, the PMP adopts ATC-level monitoring and feedback loops, linking field observations to extension advisories and documenting pesticide use trends for internal review and lender reporting.

6.6 Capacity Constraints and Operational Implications

6.6.1 Identified Constraints

The assessment highlights five primary constraints relevant to the PMP:

1. Limited enforcement and laboratory capacity;
2. Extension skills gaps in pesticide stewardship;
3. Informal supply-chain dominance;
4. Weak tracking of chemical use and residues;
5. Financial barriers to safer alternatives (biopesticides, PPE, hermetic storage).

6.6.2 Implications for the ATC

If unaddressed, these constraints could result in:

- Increased food-safety risk;
- Occupational and environmental exposure;
- Reduced effectiveness of biological controls;
- Market access challenges for ATC outputs.

6.7 Institutional Coordination and Sustainability

Coordination among regulatory bodies, extension services, agro-dealers and farmers is essential for sustained compliance. The PMP therefore applies a coordinated operational framework, linking Ogun SAPZ structures, OGADEP, community actors and ATC

management to enable information sharing, rapid corrective action and long-term sustainability.

Nigeria's regulatory and extension systems provide a solid foundation for safe chemical pest management in Ogun State. The PMP enhances this foundation by embedding practical controls, capacity support, and monitoring functions directly into ATC operations, with day-to-day regulatory compliance coordinated by the designated Environmental, Health, Safety and Safeguards (EHSS) Officer/Compliance Officer at each ATC. This ensures compliance with national requirements and AfDB Operational Safeguards while remaining realistic, cost-effective, and locally appropriate.

TABLE 6.1: Summary of Regulatory Compliance and Institutional Responsibilities (AfDB-Aligned)

Regulatory Area	Applicable Institution	Existing Framework / Instruments	Observed Capacity & Gaps	PMP Control Measure at ATC Level	Relevant AfDB Operational Safeguard
Pesticide Registration & Approval	NAFDAC	National pesticide registration and hazard classification system	Delays in re-registration; market infiltration of counterfeits	ATC Approved Input List restricted to NAFDAC-registered products	OS1, OS3, OS4, OS 6
Environmental Controls	FMEnv / NESREA / Ogun Ministry of Environment	Regulations on hazardous chemicals and waste disposal	Limited rural enforcement presence	Awareness on safe storage, disposal, and spill response	OS1, OS3, OS4
Plant Quarantine & Biosecurity	NAQS	Plant quarantine, phytosanitary inspection and pest surveillance regulations	Limited local presence in rural farming areas	Pest surveillance coordination and phytosanitary compliance awareness	OS1, OS3

Agricultural Extension	Ogun ADP (OGADEP) / Ogun MoAFS	Zonal and block extension structure	High agent-farmer ratio; limited IPM refreshers	Community IPM focal persons linked to ADP	OS1, OS3, OS 4
Input Distribution & Sales	Agro-dealers / NAFDAC / Informal Markets	Mixed formal/informal supply chains	Counterfeit inputs; weak traceability	Preferred agro-dealer engagement and farmer sensitisation	OS1, OS4
Monitoring & Feedback	OGADEP / SAPZ PCU / Regulators	Periodic inspections; limited residue testing	Weak feedback loops to farmers	ATC-level field monitoring integrated into PMP	OS1, OS4
Farmer Capacity	Farmer Groups / Cooperatives / OGADEP	Farmer Field School (FFS) and group training experience	Uneven PPE use; limited chemical literacy	PMP-based training on safe, integrated use	OS3, OS5
Institutional Coordination	State MDAs / SAPZ PCU	Existing SAPZ coordination mechanisms	Fragmented data sharing	SAPZ-linked PMP coordination platform	OS1

SECTION 7: INTEGRATED PEST MANAGEMENT (IPM) STRATEGIES

Integrated Pest Management (IPM) constitutes the core pest control framework for the proposed Agricultural Transformation Centres (ATCs) under the Ogun State Special Agro-Industrial Processing Zones (SAPZ) programme. The IPM approach integrates cultural, mechanical, biological and, where unavoidable, controlled chemical measures to manage pest populations in a manner that is economically viable, socially acceptable and environmentally sound.

The strategy explicitly prioritises non-chemical interventions, with chemical controls applied only as a last resort and in accordance with national regulations and AfDB Operational Safeguard 3 (Pollution Prevention and Resource Efficiency). By strengthening natural pest regulation processes and farmer decision-making, IPM under the PMP reduces reliance on hazardous pesticides while maintaining productivity and supply reliability for the ATCs. The IPM strategy for the Ogun SAPZ ATCs is designed to:

- Sustain crop yields and processing quality;
- Protect farmers, workers and surrounding communities;
- Minimise adverse impacts on soil, water, biodiversity and non-target species; and
- Ensure compliance with Nigerian regulations and AfDB safeguard standards.

7.1 Pest Identification and Monitoring

Accurate pest identification and systematic monitoring form the backbone of effective IPM implementation. Field assessments and consultations conducted during PMP preparation confirm that pest occurrences within the Imasayi-Sawonjo and Iwaya catchments are variable, seasonal and crop-specific. Without structured monitoring, pest control responses risk being delayed, excessive or misdirected.

Under the PMP, pest identification and monitoring activities are carried out at farm and post-harvest stages, supported by extension services and community focal persons. Observations from these activities inform timely, proportionate and evidence-based interventions.

7.1.1 Pest Profiles and Life Cycles

The PMP maintains crop-specific pest profiles that document key pest species, distinguishing features, life cycles, peak infestation periods, and indicative action thresholds. These profiles reflect pests commonly encountered in Ogun State's forest-derived and derived savannah agro-ecological zones and are consistent with the pest profile presented in Table 2.5. The profiles are used by extension agents and farmers to guide pest surveillance, decision-making, and implementation of Integrated Pest Management (IPM) measures. Key pest profiles under the Ogun SAPZ ATCs include:

i. Cassava (*Manihot esculenta*)

Major field pests include cassava green mite, cassava mealybug, whiteflies (*Bemisia tabaci*), termites, and rodents. Whiteflies are particularly significant as vectors of cassava mosaic disease, while termites may affect stem establishment and root development. Pest pressure is typically highest during prolonged dry spells. Post-harvest deterioration and root rot may also occur where fresh roots are poorly handled or delayed before processing.

ii. Cocoa (*Theobroma cacao*)

Primary pests and diseases include cocoa mirids (capsids), black pod disease (*Phytophthora spp.*), stem canker, and pod borers. Mirid damage is associated with poor canopy management and creates entry points for fungal infections. Disease incidence peaks during periods of high humidity, poor drainage, and inadequate farm sanitation.

iii. Oil Palm (*Elaeis guineensis*)

Oil palm is affected mainly by African palm weevil (*Rhynchophorus spp.*), rhinoceros beetles (*Oryctes spp.*), and fungal bud/spear rot. Infestations are often linked to poor sanitation around palms and accumulation of decomposing organic residues that serve as breeding sites.

iv. Timber / Wood Produce

Wood-boring beetles, termites, and fungal decay organisms constitute the principal pest threats, particularly during storage and seasoning of logs and sawn timber. In-field infestations are influenced by land-clearing practices, woodlot management, and proximity to infested residues.

v. Rice (*Oryza sativa*)

Rice production is commonly affected by rice stem borers, rice leaf folders, planthoppers, birds, rodents, rice blast (*Magnaporthe oryzae*), and bacterial leaf blight. Stem borer infestation disrupts nutrient translocation, leading to dead hearts and white heads, while

leaf feeders reduce photosynthetic efficiency. Pest incidence generally peaks during the vegetative to early reproductive growth stages and may be exacerbated by unsynchronized planting, poor water management, and inadequate field sanitation.

These pest profiles provide the technical basis for surveillance activities, threshold-based interventions, and the prioritisation of biological, cultural, and mechanical control measures under the PMP.

Plate 1 and 2, presents the pictures of some of the pests and diseases encountered in the catchment area.



Plate 1: Cocoa black pod disease



Plate 2: Cassava Mealybugs and mosaic virus disease

7.2 Pest Monitoring Methods

Effective IPM implementation under the Ogun SAPZ PMP relies on systematic pest monitoring conducted across farm clusters supplying the ATCs at Imasayi–Sawonjo and Iwaya/Ijebu Itale (Ijebu East LGA). Field assessments and stakeholder consultations confirm that pest incidence is seasonal, crop-specific and influenced by farm management practices, making routine surveillance essential.

Monitoring Approaches

i. Field scouting and traps

Regular farm inspections are undertaken using structured scouting protocols.

Pheromone traps, sticky traps and light traps are placed at representative farm clusters supplying the ATCs, particularly in cassava, cocoa and oil-palm production areas. These traps are checked at weekly intervals by trained youth IPM scouts and extension personnel, with observations recorded in standard field logs.

ii. Life-cycle tracking

Trap data and field observations are evaluated alongside crop growth stages to identify pest life-cycle peaks. Linking pest presence to crop phenology allows early identification of high-risk periods, enabling interventions to be timed before economic damage occurs.

iii. Surveillance calendar

A crop-specific surveillance calendar has been developed (Table 7.1), indicating scouting frequency, action thresholds and reporting timelines for each crop-pest combination relevant to cassava, cocoa, oil palm and timber systems. The calendar reflects local planting schedules and seasonal climatic patterns in Ogun State.

Table 7.1: Pest Surveillance Calendar for Priority Crops under Ogun SAPZ

Crop	Key Pest / Disease	Critical Monitoring Period	Recommended Scouting Frequency	Indicative Action Threshold	Reporting Timeline / Escalation
Cassava	Cassava Green Mite	Vegetative Stage / Dry Season	Bi-weekly	Visible infestation on >20% of sampled plants	Report within 48 hours to ATC/Extension Officer
Cassava	Cassava Mealybug	Vegetative Stage	Bi-weekly	Infestation on >15% of sampled plants	Report within 48 hours
Cassava	Whiteflies (<i>Bemisia tabaci</i>)	Early Vegetative Stage	Weekly	Presence on >10% of sampled plants	Immediate reporting for disease vector monitoring
Rice	Stem Borers	Tillering to Flowering Stage	Weekly	>10% dead hearts / white heads observed	Immediate escalation to Extension Supervisor
Rice	Rice Leaf Folders	Vegetative to Reproductive Stage	Weekly	>15% leaf damage observed	Report within 48 hours

Rice	Birds / Rodents	Grain Filling / Harvest Stage	Daily during peak period	Repeated crop damage observed	Immediate community- level action
Cocoa	Cocoa Mirids / Capsids	Pod Developme nt Stage	Bi-weekly	>5 mirids per 100 pods / visible pod damage	Report within 72 hours
Cocoa	Black Pod Disease	Wet Season / Fruiting Stage	Weekly	>10% infected pods observed	Immediate intervention required
Oil Palm	Rhinocer os Beetle	Nursery / Immature Palm Stage	Monthly	Damage observed on >10% of young palms	Report within 72 hours
Oil Palm	African Palm Weevil	Immature to Mature Plantation	Monthly	Presence of boreholes/larvae in palms	Immediate escalation
Timber / Wood Produc e	Termites	Storage / Seasoning Stage	Monthly	Any evidence of active termite colonies	Immediate preventive treatment
Timber / Wood Produc e	Wood Borers / Fungal Decay	Storage / Processing Stage	Monthly	Visible infestation/dama ge signs	Immediate corrective action

Digital Integration

Pest monitoring data are captured using simple, low-cost mobile tools already familiar within Nigeria's extension system, including KoboCollect, NAERLS Pest Tracker and the FMARDPACE e-Extension platform. Records are consolidated in a central PMP log maintained by Ogun SAPZ implementation staff, enabling timely review, trend analysis and evidence-based decision-making.

7.3 Workers' Training and Capacity Building

The effectiveness of IPM depends on the ability of farmers, extension agents and youth scouts to correctly identify pests, interpret thresholds and apply control measures safely. Capacity-building activities observed during PMP preparation confirm the importance of practical, field-based learning.

Training Modalities

i. Farmer Field Schools (FFS)

Season-long demonstration plots are used to showcase IPM and vector management practices under real farm conditions, allowing farmers to observe pest dynamics, vector risks and management outcomes directly.

ii. Training of Trainers (ToT)

Selected extension staff and Ogun SAPZ field supervisors receive advanced training, enabling them to cascade knowledge to farmer groups within the ATC catchments.

iii. Refresher training

Periodic pre-season workshops reinforce skills in pest identification, threshold-based decision-making, equipment calibration, PPE use, safe storage and emergency response.

Training Content

Training activities focus on:

- Pest and vector identification and basic life cycles;
- Decision-making based on economic thresholds rather than calendar spraying;
- Safe handling and application of biopesticides and approved chemical pesticides;
- Selection, use and maintenance of PPE
- Vector control practices, including mosquito breeding prevention, rodent management, and site sanitation measures and
- First aid, incident reporting and grievance channels.

7.4 Environmental, Health and Safety (EHS) Measures

The IPM framework under the Ogun SAPZ PMP is designed to protect farm workers, processors, nearby communities and the environment.

Key EHS Measures

i. Hazard hierarchy application

Priority is given to biological and cultural controls, followed by engineering and administrative measures, with PPE serving as the last line of protection.

ii. Buffer zones

No-spray buffer areas are respected around water bodies, homesteads and sensitive ecological features.

iii. Health monitoring

Spray operators and field scouts undergo periodic health checks, particularly where limited chemical use is unavoidable.

iv. Secure storage

Approved inputs are stored in ventilated, lockable facilities at cooperative or cluster level, equipped with spill kits and fire extinguishers.

v. Environmentally sound disposal

Empty pesticide containers are triple-rinsed, punctured and returned to approved collection or recycling channels. Obsolete products are isolated and disposed of in accordance with national regulations.

7.5 Record-Keeping and Documentation

Robust documentation underpins compliance, traceability and continuous improvement within the PMP.

i. Field records

Farm-level logs capture pest incidence, interventions applied, products used, dates, operators involved and PPE worn.

ii. Training records

Attendance registers, training materials and PPE distribution records are maintained.

iii. Residue and incident records

Where residue tests or health incidents occur, records are securely filed and summarised for PMP reporting.

iv. Compliance reviews

Periodic internal reviews assess record completeness, adherence to approved inputs and consistency with PMP procedures.

7.6 Evaluation and Feedback Mechanisms

IPM implementation is reviewed regularly to ensure it remains effective under changing pest pressures and climatic conditions.

i. **Seasonal evaluations**

Pest trends, yield impacts, control effectiveness and cost implications are reviewed at the end of each production cycle.

ii. **Compliance indicators**

Metrics include proportions of interventions triggered by thresholds and use of approved inputs.

iii. **Community feedback**

Farmer consultations and grievance mechanisms capture practical experiences and concerns.

iv. **Adaptive management**

Findings inform updates to surveillance schedules, training content and input approval lists.

7.7 Contingency Measures for Pest Outbreaks

While preventive measures are emphasised, the PMP recognises that outbreaks may still occur.

i. **Rapid verification teams**

Trained scouts and extension staff confirm suspected outbreaks within short response windows.

ii. **Pre-approved emergency input list**

A restricted list of low-risk, registered products is available for controlled emergency use.

iii. **Communication protocols**

Relevant Ogun SAPZ units, extension services and affected communities are notified promptly.

iv. **Targeted containment**

Focused interventions and temporary buffer-zone adjustments limit spread and non-target impacts.

v. **Post-event review**

Outbreak responses are documented to strengthen future preparedness.

7.8 Cultural Practices within the Ogun SAPZ Catchment

The PMP builds on cultural practices already applied by farmers within Ijebu East and surrounding communities, recognising these as the first line of defence against pests.

7.8.1 Current Practices Observed

- Crop rotation in cassava-based systems;
- Intercropping to reduce pest host density;
- Field sanitation and residue management;
- Canopy management in cocoa plantations;
- Use of neem-based botanical extracts;
- Timely harvesting and basic storage hygiene;
- Physical protection of timber and wood produce during storage.

7.8.2 Good Practices Identified

- Cocoa sanitation and canopy regulation reducing mirid pressure;
- Resistant cassava varieties lowering pest incidence;
- Improved drying and storage practices reducing post-harvest losses;
- Sanitation around oil-palm stands limiting beetle breeding.

7.8.3 Gaps Identified

- Inconsistent pest scouting and limited threshold-based action;
- Limited use of traps for early warning;
- Poor dissemination of hermetic storage technologies;
- Weak coordination of landscape-level habitat management.

7.8.4 Strengthening and Integration

The PMP consolidates existing practices into crop-specific IPM packages, supported by demonstrations and training:

Table 7.2: Pest Management Measures by Crop (Ogun SAPZ)

Crop	Key Pests/Diseases	Management Measures
Cassava	Mealybugs, green mites	Resistant cuttings, rotation, intercropping, regular scouting
Cocoa	Mirids, black pod	Canopy management, sanitation, resistant varieties, selective fungicides
Oil Palm	Rhinoceros beetle, defoliators	Sanitation, residue management, biological controls

Timber / Wood Produce	Termites, borers	Drying, physical barriers, treated storage, sanitation
Rice (Oryza sativa)	Rice stem borers, rice leaf folders, planthoppers, birds and rodents, rice blast (<i>Magnaporthe oryzae</i>), bacterial leaf blight	use of certified seed, timely planting, field scouting and water management, rodent-proof storage, moisture-controlled handling

7.9 PMP Integration

Under the Ogun SAPZ Pest Management Plan, existing cultural practices observed within the Imasayi-Sawonjo and Iwaya, Ijebu-Itele ATC catchments are consolidated into a structured IPM framework. Rather than introducing unfamiliar approaches, the PMP formalises what farmers already practice and strengthens them through timing, coordination and institutional support.

7.9.1 Cultural Control Measure

- i. Crop-specific IPM packages for cassava, cocoa, oil palm and timber/wood produce, designed around established farmer practices and locally observed pest pressures.
- ii. Surveillance and early-warning systems, combining routine scouting and simple traps to ensure cultural measures are applied at the most effective stages of pest development.
- iii. Post-harvest hygiene and improved storage, including hermetic storage where appropriate, incorporated as standard components of pest management.
- iv. Structured training modules and Farmer Field Schools, ensuring combined practices are consistently applied and sustained across seasons.

This approach ensures that the PMP reflects reality on the ground, clearly identifies strengths and gaps, and organises cultural controls into a coordinated, cost-effective system before escalating to higher-risk interventions.

7.9.2 Mechanical and Physical Control Measures

Mechanical and physical controls complement cultural practices by directly reducing pest populations through non-chemical means. These measures are low-cost, environmentally benign and compatible with smallholder production systems within the Ogun SAPZ.

Key measures applied include:

- Manual removal: Hand-picking of visible pests such as caterpillars and pod-feeding insects during routine scouting, particularly in cocoa and cassava fields.
- Physical barriers and screens: Use of fine-mesh coverings on storage containers to reduce infestation by storage pests.
- Light and sticky traps: Deployed selectively for adult moths and beetles to suppress early pest populations and support monitoring.
- Storage hygiene: Cleaning and preparation of storage structures prior to use, including sweeping, washing and application of approved botanical repellents.

These measures reduce pest pressure while minimising risks to human health and the environment.

7.9.3 Biological Control Measures

Biological control forms a core component of the Ogun SAPZ PMP. The approach prioritises naturally occurring enemies, registered microbial products and locally accepted botanicals that have been used successfully across Nigeria's humid and sub-humid agro-ecological zones.

Effectiveness in the Nigerian Context

Experience from Nigerian IPM programmes demonstrates the effectiveness of biological controls when properly timed and combined with cultural practices:

- *Apoanagyrus lopezi*, introduced for cassava mealybug control, remains established nationwide and continues to suppress mealybug populations without adverse environmental effects.
- *Trichogramma* spp., used on a pilot basis in cereal systems, have demonstrated reductions in stem-borer damage where released correctly.
- Registered microbial biopesticides, including *Bacillus thuringiensis* (Bt) for lepidopteran pests and entomopathogenic fungi (*Beauveria*, *Metarhizium*), have proven effective under Nigerian field conditions.
- Neem-based biopesticides, registered by NAFDAC, are widely used by smallholders for control of sucking and chewing insects in perennial and arable crops.

Field evidence indicates yield improvements when these agents are applied at recommended timings and integrated with cultural controls.

Risk Management and Regulatory Compliance

The PMP does not introduce exotic biological control organisms. All agents used are either:

- Indigenous natural enemies enhanced through habitat management;
- Long-established classical biological control agents already approved nationally;
or
- NAFDAC-registered microbial or botanical biopesticides.

Augmentative releases, where applied, are sourced locally and supervised by trained extension personnel. Release activities and outcomes are documented, and post-release monitoring focuses on effectiveness and non-target impacts. Conservation biological control measures – such as maintaining vegetation refuges and avoiding broad-spectrum pesticides – pose negligible ecological risk.

Integration with Other IPM Measures

Biological controls are applied as part of an integrated system that combines surveillance data, cultural practices and threshold-based decision-making. Farmers and extension agents are trained to recognise beneficial organisms, time applications correctly and avoid unnecessary interventions.

7.9.4 Chemical Control Measures (Last Resort)

Chemical pesticides are applied only where preventive, cultural, mechanical and biological measures have proven insufficient and pest populations exceed established economic thresholds.

In accordance with the FAO/WHO Code of Conduct on Pesticide Management and AfDB safeguards, the PMP:

- Excludes all Highly Hazardous Pesticides (HHPs), including WHO Class Ia and Ib formulations.
- Permits WHO Class II pesticides only under justified, controlled conditions and where registered by NAFDAC.
- Prohibits Persistent Organic Pollutants (POPs), obsolete pesticides and non-registered formulations.

Only NAFDAC-registered, low-toxicity products with minimal persistence and limited non-target impacts are permitted. Approved and banned products are documented in Annex B.

Additional safeguards include:

- Application by trained and certified personnel only;
- Mandatory PPE use during mixing, loading and spraying;
- Weather-appropriate application to minimise drift; and
- Comprehensive record-keeping of products, quantities, dates and operators.

Chemical control remains a measure of last resort, aligned with AfDB ISS, World Bank ESS3 and Nigerian regulatory requirements.

7.10 Thresholds and Decision-Making

Each priority pest has a defined economic threshold that triggers intervention. Examples are presented in Table 7.3

Table 7.3: Examples of Economic Thresholds

Crop / Produce	Pest	Threshold
Cassava	Mealybug	≥ 5 insects per 10 leaves
Cassava	Whiteflies	≥ 10 adults per plant or visible infestation on >10% of sampled plants
Cocoa	Mirids	Visible damage on ≥ 2 pods/tree
Cocoa	Black Pod Disease	≥ 10% of pods infected within sampled plot
Rice	Stem Borers	≥ 10% dead hearts/white heads observed
Oil Palm	Rhinoceros Beetle	Damage observed on ≥ 10% of immature palms within monitored plot
Oil Palm	Rodents	Visible feeding damage on ≥ 5% of fresh fruit bunches/storage stock
Timber / Wood Produce	Termites	Presence of active colonies or visible infestation in ≥ 5% of stored wood stock
Timber / Wood Produce	Wood Borers	Visible infestation/damage in ≥ 5% of stored timber stock
Storage Produce	Bruchids	> 5 beetles/kg of stored seed

Decision-making is informed by:

- Routine scouting data;
- Trend analysis from compiled monitoring records; and
- Farmer feedback obtained during extension visits.

7.11 Monitoring and Adaptive Evaluation

The PMP adopts adaptive management to ensure continuous improvement:

- Post-intervention monitoring assesses pest resurgence, yield outcomes and any residue concerns.
- Farmer feedback surveys capture constraints, innovations and indigenous practices.
- Periodic review workshops review results, adjust thresholds and update SOPs.

This iterative process aligns with FAO IPM evaluation principles.

7.12 Post-Harvest Pest Management

Post-harvest pest management under the Ogun SAPZ PMP applies to on-farm storage, aggregation centres and the proposed ATC warehouses handling cassava products, cocoa beans, oil-palm produce and other priority crops.

The PMP operationalizes IPM and full pesticide life-cycle stewardship consistent with:

- FAO/WHO Code of Conduct;
- AfDB Integrated Safeguards System; and
- Nigerian regulations (NAFDAC and NESREA).

Priority controls include:

- Achieving safe moisture content before storage;
- Sanitation, palletisation, ventilation and FIFO management;
- Use of hermetic storage systems where applicable;
- Routine inspection, trap monitoring and segregation of infested lots.

Chemical treatments in storage are used only where non-chemical measures are insufficient and are implemented under strict occupational health and safety controls.

7.13 Standards and Compliance Alignment

Table 7.4: Standards and Compliance Framework

Standard Instrument /	Key Requirement	Where Addressed
FAO/WHO Code of Conduct	IPM-first, lifecycle stewardship	Sections 7–14
WHO Pesticide Hazard Classification	Exclude Ia/Ib, restrict II	Sections 7.10–7.11
AfDB Integrated Safeguards System	OS3-Pollution Prevention and Resource Efficiency, OS4-Community Health, Safety and Security), and OS5 Labour, Working Conditions and Occupational Health & Safety	Sections 7–14
World Bank ESS3 / OP 4.09	PMP and worker protection	Sections 7–14
NAFDAC Regulations	Registered products only	Sections 7.9–7.10
NESREA Regulations (2023)	Storage, labelling, waste	Sections 7.13–7.14
SON / Codex Mycotoxin Limits	Food safety compliance	Section 7.13

These provisions translate international and national standards into day-to-day controls for Ogun SAPZ operations, ensuring pest risks are managed effectively while protecting farmers, communities and the environment.

7.14 Crop-by-Crop Storage Risk Profile and Control Targets (Ogun SAPZ — Imasayi & Ijebu East)

Post-harvest risks for the Ogun SAPZ supply chains are dominated by inadequate moisture control, poor handling and storage hygiene, and delays between harvest/collection and processing. For the proposed ATCs these drivers were assessed and practical control targets were adopted for each priority commodity.

Table 7.5: Safe Moisture / Storage Targets (Ogun SAPZ crops)

Crop / Product	Storage / Quality Target	Practical Notes (Ogun SAPZ)
Cassava (chips / flour)	≈10-13% MC	Deep drying (thin slicing) recommended before storage; hermetic jute/liner bags or dry sealed rooms for chips/flour. Fresh roots must be processed quickly to avoid deterioration.
Cocoa (dry fermented beans)	≈6-8% MC	Post-fermentation drying to ≤7% is standard for quality and to prevent mould; store in clean, dry, ventilated sacks on pallets.
Oil palm (Fresh Fruit Bunches – FFB)	Process within 24-48 hours; avoid stacking >24 h where possible	FFB are highly perishable; short holding times required. For palm kernels (if stored) target ≤8% MC. Waste/press cake stored dry to avoid pest breeding.
Rice (paddy / milled rice)	Paddy: ≤13-14% MC; Milled rice: ≤12-13% MC	Timely drying after harvest is critical to prevent mould, insect infestation, and quality loss; use raised platforms or mechanical dryers where available; store in clean, dry, rodent-proof facilities, preferably in lined or hermetic bags.
Timber / wood produce (seasoned lumber)	Target MC 12-15% for seasoned timber; <20% for short-term yard storage	Timber for processing must be adequately seasoned or treated; stacked off ground, covered, well-ventilated; avoid prolonged wet storage.

Rationale: Targets are consistent with international post-harvest guidance adapted to local practice and the commodities handled at Imasayi and Iwaya. For perishable products (FFB) rapid processing is the primary control; for dry products (cocoa beans, cassava chips, palm kernels, timber) low moisture plus good storage hygiene are non-negotiable intake criteria.

7.15 Key Storage Pests, Damage Signs and Immediate Actions

Table 7.6: Principal Storage / Handling Pests and Indicators (Ogun SAPZ)

Commodity	Principal Storage / Handling Pests & Drivers	Typical Signs / Impacts	Immediate Control Response
Cassava chips / flour	Moulds (<i>Aspergillus</i> spp.), storage beetles (e.g., <i>Cryptolestes</i> , <i>Tribolium</i> spp.), rodent nibbling	Off-odours, caking, discolouration, weight loss	Segregate affected lots; re-dry to target; hermetic transfer; investigate source moisture
Cocoa beans	Moths (<i>Ephestia</i> spp.), flour beetles (<i>Tribolium</i> spp.), mould (post-harvest fermentation not completed)	Webbing, dusty frass, off-odour, aflatoxin risk if wet	Segregate; re-dry; sanitation; hermetic or ventilated storage; lab test if mould suspected
Oil palm (FFB & kernels)	Rodents, ants, infestations in processing waste; rapid deterioration of FFB	Rapid heating/rot of FFB, rancidity risk in kernels if not dried	Prioritise processing within 24–48 h; dry kernels to $\leq 8\%$; remove waste promptly
Rice (paddy / milled rice)	Storage insects (rice weevil <i>Sitophilus oryzae</i> , lesser grain borer <i>Rhyzopertha dominica</i>), rodents, mould due to high moisture	Grain perforation, powdery residues, weight loss, musty odour, reduced milling quality	Dry to target moisture; sieve and clean; use hermetic or lined bags; implement rodent control; fumigate only where approved and supervised
Timber / wood produce	Termites, powder-post beetles, wood borers	Visible boreholes, frass, structural weakening	Move timber off soil, inspect and isolate infested batches; treat with approved preservatives / kiln drying

Management implication: Any sign of active internal infestation or mold requires immediate segregation and corrective action (re-drying, hermetic transfer, isolation), and verification of MC and hygiene. Fumigation is considered only after non-chemical options are exhausted and after verifying gas-tight conditions.

7.16 Monitoring, Inspection and Thresholds (Storage & Short-term Holding)

A practical monitoring protocol was established for ATC intake and storage operations.

Stored-Product Monitoring Protocol (condensed)

- Moisture checks: calibrated MC meter at intake for every batch; record %MC, date, operator, device ID. (Every lot at intake; re-check per inspection cycle.)
- Visual / sieve checks: 1–2 kg composite sieving for dry products (cassava chips, cocoa, kernels) at intake and during inspections. Record live insects/kg.
- Trapping: pheromone or sticky traps deployed in warehouses for cocoa and dry-product stores; weekly checks first month, then bi-weekly.
- Processing hold checks (FFB): FFB holding duration logged; any batch >24–48 hours flagged for priority processing or rejection.
- Temperature monitoring: probe checks for stored dry commodities to detect hotspots.

Inspection frequency: intake (every lot); weekly during first month; bi-weekly during humid/wet season; monthly in stable dry season.

Action thresholds (examples)

- Any live internal feeders detected → immediate segregation and hermetic transfer; consider fumigation only after hermetic & non-chemical options evaluated.
- MC above target → reject for storage; require re-drying prior to acceptance.
- Rising trap counts for external feeders / moths over two consecutive inspections → sanitation, stack rotation, targeted control.

7.17 Storage IPM Toolbox — Hierarchy of Controls (Ogun SAPZ)

1. Prevention & Good Storage Practice (GSP): drying to MC targets; clean stores; pallets and off-ground stacking; FIFO/FEFO; prompt removal of processing waste.
2. Rapid processing control (oil palm): minimise FFB holding time; provide transport and processing scheduling.
3. Hermetic storage: use of sealed liners / hermetic bags for cassava chips, cocoa beans and kernels where appropriate.
4. Physical measures: sieving, aspiration, stack rotation, temperature management.
5. Biological / botanical options: registered, local botanicals for surface protection where appropriate.

Chemical control (last resort): Application of chemical treatments shall be limited to NAFDAC-registered, non-highly hazardous pesticide products and shall only be undertaken where non-chemical and preventive measures have proven ineffective. Residual treatments shall be restricted to empty-store applications and conducted in accordance with manufacturer instructions, national regulatory requirements, and approved safety protocols. The use of WHO Class Ia and Ib pesticides, methyl bromide, Persistent Organic Pollutants (POPs), and other highly hazardous pesticides is strictly prohibited.

7.18 Mycotoxin & Quality Management (Cocoa & Cassava chips / flour)

- Cocoa beans: dried to $\leq 7\%$ MC to limit mould/reworker incidence and meet buyer specs. Any mould-tainted lots are evaluated and tested for mycotoxins; non-conforming lots are segregated and diverted.
- Cassava chips / flour: prevent post-drying moisture pickup; monitor for mould and odour; reject or re-dry suspect lots.
- Quality checks: in take QC sheet, MC log, trap and sieve logs, and lab tests where mould or off-odours are suspected.

7.19 Safe Use of Fumigants and Pesticides

- Regulatory compliance: Only NAFDAC-registered products permitted; HHPs (WHO Ia/Ib) and POPs are excluded.
- Fumigation and Treatment Controls: Any fumigation or residual pest treatment shall be undertaken only by certified and competent personnel using NAFDAC-registered, non-highly hazardous pest control products in accordance with manufacturer instructions, permit-to-work procedures, safety protocols, warning signage requirements, and documented post-treatment clearance prior to re-entry. The use of WHO Class Ia and Ib pesticides is strictly prohibited. Records & transparency: full fumigation plans, exposure logs and clearance certificates filed at ATC HQ.

Table 7.7 Roles & Responsibilities (Storage & Post-harvest control)

Role	Responsibility (storage & post-harvest)
SAPZ PIU (E&S)	Approve SOPs, ensure AfDB/National compliance, budget for monitoring and testing, audit.
ATC / Warehouse Manager	Intake QC (MC), drying oversight, sanitation, trap/inspection schedule, record keeping, trigger actions.
Quality / Food Safety Team	Sampling, lab testing (mold/mycotoxin), lot segregation, food-safety compliance.
Extension / Out-grower Liaison	Farmer training on pre-harvest practices, drying, handling and traceability.

Certified Contractor	Fumigation	Plan/execute fumigation, exposure monitoring, incident reporting.
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7.20 Incident Response & Escalation (summary)

- Internal feeders (any live): immediate segregation → hermetic transfer → evaluate for fumigation only if hermetic not possible and gas-tightness confirmed.
- Excess moisture at intake: reject or re-dry prior to acceptance.
- FFB backlog (>48h): prioritise processing; reject if quality compromised.
- Mold / off-odour detected: lab test for mycotoxin; segregate and apply CAPA with supplier.

7.21 M&E Indicators (storage focus)

- Field-Level IPM Performance Indicators
- Percentage of farmers applying pest management decisions based on established economic/action thresholds: ≥70%
- Percentage reduction in use of highly hazardous pesticides (HHPs) across participating farmer groups: 100% elimination target
- Percentage of farmers adopting at least two recommended IPM practices: ≥80%
- Percentage of trained farmers demonstrating correct pest identification and IPM application during monitoring visits: ≥75%
- Number of pest/vector surveillance reports submitted by extension officers/field monitors per month: 100% compliance with reporting schedule
- Storage/Post-Harvest Performance Indicators
- Percentage of lots meeting moisture content (MC) targets at intake: ≥95%
- Percentage of inspections completed on schedule: ≥90%
- Live internal feeders in finished goods: Zero tolerance
- Hermetic uptake (cassava chips / cocoa / kernels): ≥80% of high-risk lots
- Pest treatment/fumigation incidents or injuries: Zero

SECTION 8: PRODUCTIVITY AND SUSTAINABILITY BENEFITS OF PEST MANAGEMENT OPTIONS

8.1 Introduction

A central consideration for the Pest Management Plan (PMP) under the Ogun State Special Agro-Industrial Processing Zone (SAPZ) is how alternative pest-management approaches perform against productivity, safety and sustainability objectives. Given the scale of aggregation, storage, processing and supply-chain coordination envisaged for the proposed Agricultural Transformation Centres (ATCs) at Imasayi and Iwaya, pest control practices must be both effective and institutionally manageable.

This chapter assesses three realistic pest-management options applicable to the Ogun SAPZ context:

- 1. Option A: Exclusive use of Biological Pest Control (BPC) and Nature-Based Solutions (NBS);*
- 2. Option B: Combination of BPC/NBS with proportionate, threshold-based chemical use (Integrated Pest Management - IPM);*
- 3. Option C: Exclusive reliance on chemical pest control.*

Each option is evaluated using agreed criteria to support transparent, evidence-based decision-making and to guide the selection of a preferred approach for implementation across cassava, cocoa, oil palm and timber value chains.

8.2 Assessment Criteria

The three options were assessed against the following criteria:

- i. Agronomic Effectiveness:** Ability to manage key pests affecting cassava, cocoa, oil palm, rice and timber; impact on yield stability and resilience to pest outbreaks.
- ii. Environmental Impact:** Effects on soil health, biodiversity (including beneficial insects), water quality and non-target organisms.
- iii. Worker and Community Health and Safety:** Exposure risks, accident potential, food-residue compliance, and broader public-health considerations.
- iv. Economic Performance:** Cost of inputs, labour requirements, yield impacts, post-harvest quality, market acceptance, and long-term cost efficiency.

v. Institutional and Social Considerations: Alignment with Nigerian IPM policy, NAFDAC regulations, AfDB Operational Safeguards, and levels of community acceptance and ownership.

8.3 Option A — Sole Use of Biological Pest Control and Nature-Based Solutions

Agronomic Effectiveness

Exclusive reliance on BPC and NBS emphasises cultural practices (sanitation, pruning, timing of harvest), habitat management, use of tolerant varieties, botanicals, and biological agents such as parasitoids and microbial formulations. Within Ogun State, these measures have demonstrated moderate success in reducing pest pressure in cassava and cocoa systems when consistently applied. However, sole reliance on non-chemical measures may be slow to suppress sudden or severe infestations, particularly in oil palm and timber systems where pest populations can build rapidly under favourable conditions.

Environmental Impact

This option provides the highest level of environmental protection. It avoids synthetic pesticide residues, conserves pollinators and natural enemies, protects soil micro-organisms, and minimises risks to surface and groundwater. Ecosystem resilience is strengthened through reduced chemical disturbance.

Worker and Community Health and Safety

Human health risks are minimal because chemical exposure pathways are largely eliminated. Botanical controls and cultural measures are generally low-toxicity, and public-health co-benefits include reduced contamination of food products and surrounding environments.

Economic Performance

While input costs are generally low and based on locally available materials, labour requirements for monitoring, sanitation and manual control can be relatively high. In the absence of rapid suppression during outbreaks, yield losses or quality deterioration may occur, particularly where surveillance systems are weak.

Institutional and Social Considerations

This option is fully consistent with national IPM policy and AfDB safeguards and is usually well accepted by farming communities. However, it requires strong extension support, coordination and consistent application to remain effective at scale.

8.4 Option B — Combination of BPC/NBS with Proportionate Chemical Use (Integrated Pest Management)

Agronomic Effectiveness

Under this option, biological, cultural and preventive measures form the primary line of defence, while low-toxicity, NAFDAC-registered pesticides are applied only when economic or action thresholds are exceeded. Experience from southwest Nigeria indicates that this approach delivers more stable yields across cassava, cocoa, rice and oil palm systems, while reducing the frequency and intensity of chemical applications. Preservation of natural enemies contributes to longer-term pest suppression.

Environmental Impact

Environmental risks are significantly lower than under exclusive chemical control. Limited and targeted pesticide use reduces residue loads and protects non-target organisms, while BPC/NBS maintain soil and ecological functions essential to sustainable production.

Worker and Community Health and Safety

Health risks are substantially reduced compared to conventional chemical-intensive practices. Fewer spray rounds, careful product selection, mandatory use of PPE and structured training lower exposure risks and improve compliance with food-safety and residue standards.

Economic Performance

This option provides the most favourable cost-benefit profile. Although initial investments in training, monitoring and coordination are required, these are offset by reduced chemical costs, improved yields and better market acceptance, including compliance with quality standards for cocoa and processed cassava products.

Institutional and Social Considerations

The IPM option is fully aligned with Nigerian regulations, AfDB Operational Safeguards and Ogun SAPZ objectives. It builds on existing farmer familiarity with both cultural and chemical practices, facilitating adoption, while requiring moderate strengthening of institutional monitoring and extension systems.

8.5 Option C — Exclusive Chemical Control

Agronomic Effectiveness

Exclusive chemical control can achieve rapid suppression of pest populations and short-term yield protection. However, repeated use of broad-spectrum pesticides increases the risk of resistance, pest resurgence and secondary pest outbreaks. These trends have been documented in cassava and cocoa systems where reliance on chemicals alone has escalated over time.

Environmental Impact

This option presents the highest environmental risk, including contamination of soil and water, harm to pollinators and beneficial insects, and degradation of ecosystem services. Effective enforcement of buffer zones and disposal practices would be difficult at smallholder and aggregation levels.

Worker and Community Health and Safety

Chemical-only control carries the highest risk of acute and chronic exposure for applicators and surrounding communities. Spray drift, accidental poisoning and residue exceedances pose significant health and reputational risks, particularly for markets with strict quality requirements.

Economic Performance

Recurrent input costs for pesticides, equipment, PPE and waste disposal are high and tend to increase as resistance grows. Any short-term gains are often offset by declining effectiveness, market rejection due to residues, and health-related costs.

Institutional and Social Considerations

This option is weakly aligned with national IPM policy and AfDB safeguards and is likely to face regulatory scrutiny and community resistance. Management of hazardous waste and compliance obligations would impose additional institutional burdens.

8.6 Comparative Analysis of the Three Options

A side-by-side assessment of the three options highlights clear trade-offs between productivity and sustainability. Table 8.1 summarises the key findings under Ogun SAPZ conditions.

Table 8.1: Comparative Assessment of Pest Management Options

Criterion	Option A: Sole BPC/NBS	Option B: IPM (BPC/NBS + Chemicals)	Option C: Exclusive Chemicals
Agronomic effectiveness	Moderate; slower during outbreaks	High and stable	Initially high; declines over time
Environmental impact	Very low	Low-moderate	High
Worker & community H&S	Very low risk	Low risk with controls	High risk
Economic performance	Low inputs; possible yield risk	Best cost-benefit	High recurrent costs
Institutional/social alignment	Strong	Very strong	Weak

8.7 Recommended Approach for Ogun SAPZ ATCs

Based on the comparative assessment, **Option B – Integrated Pest Management** is adopted as the core pest-management approach for the proposed ATCs under the Ogun SAPZ. This approach offers the most balanced pathway to achieving productivity, environmental protection and safeguard compliance.

Key recommendations include:

- Adoption of IPM as the standard operational framework across cassava, rice, cocoa, oil palm and timber value chains;
- Strengthening preventive and biological measures to minimise chemical inputs;
- Restricting chemical use to threshold-based, supervised applications using approved products;
- Integrating surveillance, monitoring and record-keeping into ATC operations to guide timely interventions;
- Systematic monitoring and reporting of pest trends, control actions, health incidents and environmental indicators.

The assessment confirms that while sole biological approaches are environmentally safest, they may be insufficient under outbreak conditions, and exclusive chemical control poses unacceptable long-term risks. The integrated IPM approach aligns with national policy, AfDB requirements and Ogun SAPZ objectives, providing a robust foundation for sustainable agricultural transformation.

8.8 Health, Environmental and Safety Considerations

Safe, environmentally responsible pest management is a prerequisite for the success of the Ogun State Special Agro-Industrial Processing Zone (SAPZ). The proposed Agricultural Transformation Centres (ATCs) will aggregate, store and process cassava, cocoa, oil palm and timber products sourced from a wide network of smallholder and

commercial producers. In the absence of a robust health, environmental and safety (HES) framework, pest-control activities intended to protect crops could expose workers, surrounding communities and ecosystems to unacceptable risks.

This section sets out the PMP framework for hazard identification, regulatory compliance, worker and community protection, safe handling and application of pest-control products, emergency preparedness, waste management, documentation and continuous improvement. The framework reflects conditions in Ogun State, builds on existing agricultural practice, and aligns with Nigerian regulations, AfDB Operational Safeguards (OS 2, OS 3 and OS 4), the FAO/WHO International Code of Conduct on Pesticide Management, and Federal Ministry of Environment (FMEnv) guidelines.

8.9 Hazard Identification: Exposure Risks and Health Effects

Effective risk management begins with understanding the hazards associated with pest management across the Ogun SAPZ value chains. Field observations and stakeholder consultations indicate that pesticide handling among smallholder suppliers is often characterised by limited risk assessment, inadequate PPE use and unsafe storage practices.

Under this PMP, every pest-control product proposed for use within SAPZ-supported supply chains will undergo prior screening based on:

- **Hazard Profile:** WHO/FAO toxicity classification, active ingredients, formulation type, persistence and bioaccumulation potential;
- **Exposure Pathways:** inhalation during spraying in cocoa and oil palm plantations; dermal exposure during mixing and application in cassava fields; indirect exposure of households due to improper storage and container reuse;
- **Human Health Effects:** acute impacts (skin and eye irritation, headaches, dizziness, nausea) and potential chronic effects (neurological, endocrine or reproductive disorders);
- **Ecological Effects:** non-target impacts on pollinators, soil organisms, surface-water ecosystems and beneficial predators.

Crop-specific hazard reference sheets will be prepared and displayed at ATCs, agro-input distribution points and training centres in English and local languages, to inform farmers and workers of risks and required control measures.

8.10 Legal and Regulatory Compliance

Pest management under Ogun SAPZ shall operate within a consolidated compliance framework covering national legislation and international standards, including:

- i. NAFDAC Registration: Only pesticides and biopesticides approved and currently registered by NAFDAC shall be procured or promoted under the project;
- ii. FMEnv and NESREA Regulations: Storage, transport, handling and disposal of agrochemicals and related waste shall comply with National Environmental (Agrochemicals) Regulations;
- iii. FAO/WHO International Code of Conduct: The PMP adheres to principles on pesticide risk reduction, labelling, safe use and progressive elimination of highly hazardous pesticides;
- iv. AfDB Operational Safeguard (OS2,3&4): Pollution prevention, hazardous materials management and emergency preparedness requirements are fully integrated;
- v. Ogun State Regulations: Applicable state laws on public health, environmental protection and waste management shall be enforced.

A designated Environmental and Social (E&S) Officer within the SAPZ Project Implementation Unit (PIU) shall maintain a register of approved products, safety data sheets (SDS), licences and disposal certificates, and prepare periodic compliance reports for regulators and AfDB supervision.

8.11 Worker and Community Health and Safety

Protection of workers, outgrowers and surrounding communities is a core objective of the PMP. Risk management measures are structured around the recognised hierarchy of controls.

Hierarchy of Controls

1. **Elimination/Substitution:** Prohibition of WHO Class Ia and Ib pesticides; preference for botanicals, microbial agents and low-toxicity products;
2. **Engineering Controls:** Designated mixing areas with impervious floors and runoff control; vegetated buffer zones around plantations, water bodies and settlements;
3. **Administrative Controls:** Training, work procedures, medical surveillance, job rotation and advance community notification;

4. **Personal Protective Equipment (PPE):** Used as the final protective barrier. Minimum PPE requirements for pesticide handling, mixing, loading, and application shall include chemical-resistant gloves, coveralls or protective clothing, chemical-resistant aprons (particularly during mixing/loading operations), safety boots, respiratory protection/masks appropriate to the chemical in use, eye protection/goggles, and face shields where splash risk exists.

Administrative Measures

All SAPZ-supported farmers, applicators and ATC staff shall receive induction and refresher training on hazard recognition, label interpretation, calibration, spill response and first aid. High-exposure tasks (mixing concentrates, loading sprayers) shall be rotated to reduce cumulative risk. Health screening of applicators shall be conducted periodically, with referral pathways to local health facilities.

Communities shall be informed in advance of planned spray operations, and buffer zones maintained around schools, clinics, water points and residential areas.

Mandatory PPE Use

Appropriate PPE shall be provided and its use enforced during pesticide handling and application. Minimum PPE includes:

- Nitrile gloves
- Respirators or face masks appropriate to product labels
- Long-sleeved overalls
- Safety boots
- Eye protection (goggles or face shields)

Training includes correct use, cleaning and replacement. PPE procurement and replacement schedules shall be included in annual SAPZ budgets.

8.12 Pesticide Handling and Storage

Centralised pesticide storage facilities at ATCs shall be designed and operated in line with Nigerian and FAO standards:

- i. Lockable, well-ventilated structures with impervious floors and secondary containment;
- ii. Segregation of liquids and solids and incompatible products;
- iii. Clearly marked signage restricting access to authorised personnel;
- iv. Prohibition of food, feed or drinking water storage in pesticide facilities;

- v. FIFO inventory management to prevent obsolete stock;
- vi. Supply restricted to certified agro-dealers.

8.13 Safe Application of Pest-Control Products

Only trained and authorised operators shall apply pest-control products. Equipment shall be calibrated prior to use to minimise over-application and drift. Pre-harvest intervals (PHIs), re-entry intervals and buffer zones shall be strictly observed.

Applications shall be carried out during low-wind conditions, preferably early morning or late afternoon. Each application shall be recorded, including product name, quantity, crop, date, applicator and location, to ensure traceability.

8.14 Emergency Preparedness and Response

The PMP includes an emergency preparedness framework addressing accidental exposure, spills, fires and extreme weather events. A written emergency response plan shall be displayed at storage and mixing points and include:

- Spill containment and clean-up procedures;
- First aid and referral arrangements with local health facilities;
- Fire response measures and appropriate extinguishers;
- Flood contingency actions for storage areas.

Spill kits, eye-wash stations, first-aid boxes and emergency showers shall be provided. Mock drills shall be conducted periodically to test readiness and improve response.

8.15 Waste Management and Environmental Safety

Empty pesticide containers shall be triple-rinsed, punctured and returned to designated collection points at ATCs. Disposal shall be undertaken only through licensed recyclers or hazardous-waste handlers approved by OGEPA, FMEnv and NAFDAC. On-farm burial or burning of containers is prohibited.

Vegetated buffer strips and proper drainage shall reduce runoff into streams and wetlands. Obsolete or banned products identified in the supply chain shall be documented and disposed of in coordination with relevant authorities.

8.16 Environmental Safeguards

To protect biodiversity, soils and aquatic ecosystems, the PMP establishes the following safeguards:

- **Buffer Zones:** Mandatory 10–30 metre buffers around rivers, streams, wetlands, community wells, schools and livestock areas;
- **Banned Substances:** Prohibition of persistent organic pollutants (e.g. DDT, lindane, aldrin, dieldrin) and any unregistered products;
- **Disposal Protocols:** Triple rinsing and disposal through authorised facilities only;
- **Environmental Monitoring:** Periodic soil and water sampling in high-risk areas by relevant authorities.

These measures align with Nigeria's National Environmental (Agrochemicals) Regulations and AfDB OS3.

8.17 Community and Ecosystem Considerations

Pest management practices can affect food safety, pollinators and broader agro-ecosystem services. Accordingly:

- **Pollinator Protection:** Avoid chemical applications during flowering; promote bee-friendly methods;
- **Food Chain Safety:** Strict adherence to PHIs to avoid residue contamination in cassava products, cocoa beans and palm produce;
- **Livestock Protection:** Livestock exclusion from treated fields for at least 7–10 days post-application, with advance notice through extension services.

8.18 Record Keeping and Documentation

Transparent documentation underpins compliance and continuous improvement. The SAPZ PIU shall maintain a centralised database covering:

- Approved products, quantities and usage locations;
- Training records and health surveillance;
- Incident, spill and corrective action reports;
- SDS and regulatory approvals.

Records shall be retained for a minimum of five years and made available to regulators and AfDB supervision missions.

8.19 Monitoring and Continuous Improvement

The HES performance of the PMP shall be reviewed regularly. SAPZ PIU staff and extension agents shall conduct periodic inspections of storage, handling and application practices. Environmental monitoring and community feedback mechanisms shall inform corrective actions.

An annual review of HES performance shall be undertaken, with findings used to update SOPs, training modules and resource allocation, ensuring continuous improvement in pest-management safety and sustainability.

SECTION 9: STAKEHOLDERS ENGAGEMENT AND AWARENESS

9.1 Introduction

Stakeholder engagement is a cornerstone of the effective implementation of this Pest Management Plan (PMP) for the Ogun State Special Agro-Industrial Processing Zone (SAPZ) Agricultural Transformation Centre (ATC). Integrated Pest Management (IPM) is not dependent solely on technical solutions; rather, its success relies on inclusive participation, local ownership, and continuous feedback from key stakeholders.

This section presents the engagement and awareness framework designed to ensure that farmers, public institutions, research bodies, agro-processors, civil society organizations, and the wider public are meaningfully involved in pest management planning, implementation, and monitoring throughout the lifecycle of the Ogun SAPZ ATC project.

In line with the African Development Bank (AfDB) Operational Safeguard (OS) 10 & 7 and the FAO participatory IPM approach, the PMP adopts a multi-stakeholder engagement strategy that emphasizes transparency, inclusivity, accountability, and responsiveness.

9.2 Stakeholder Engagement Plan

- Although a separate Stakeholder Engagement Plan (SEP) is being prepared for the Project, the stakeholder engagement approach for the Ogun SAPZ ATCs is designed to build awareness, strengthen capacity, and promote behavioural change through the following measures: Inclusive workshops and sensitization meetings at community and ATC catchment levels
- Field days and demonstration activities on IPM practices
- Local-language radio programmes to disseminate pest alerts and safe pesticide use information
- Targeted engagement of women and youth through extension and training initiatives
- Structured feedback mechanisms through farmer groups, cooperatives, and liaison with SAPZ governance structures

These measures ensure two-way communication and provide platforms for integrating stakeholder feedback into PMP implementation.

9.3 Stakeholder Identification and Roles

A stakeholder mapping exercise was conducted to identify key actors based on their interest, influence, and role in pest management within the Ogun SAPZ ATC. Identified stakeholders and their responsibilities are presented in **Table 9.1**.

Table 9.1: Stakeholder Identification and Roles

Stakeholder Group	Role in PMP Implementation
Smallholder Farmers and Out-Growers	Primary adopters of IPM practices and sources of local pest information
Agro-Processors	Ensure consistent supply of pest-free agricultural produce from out-grower schemes
Women and Youth Groups	Act as IPM change agents, field scouts, and Farmer Field School (FFS) facilitators
Traditional Rulers and Community Leaders	Support community mobilization, land-use compliance, and conflict resolution
NGOs / CSOs	IPM training, community sensitization, advocacy, and environmental monitoring
Research Institutions and Universities	Development of pest control packages, trials, and biological control research
Government Ministries, Departments and Agencies (MDAs)	Policy enforcement, extension services, regulation, and monitoring
Licensed Pesticide Applicators / Fumigation Contractors	Conduct controlled pesticide/fumigation applications and ensure compliance with safety and technical standards
Agro-Input Manufacturers / Suppliers	Supply approved pest control products and provide technical product stewardship/support
Development Partners (AfDB, FAO, others)	Technical assistance, financing, and oversight

This multi-actor structure ensures that pest management actions are informed by indigenous knowledge, scientific evidence, and public interest considerations.

9.4 Engagement Methods

To achieve broad participation and sustained behavioural change, the following engagement methods will be applied:

Workshops and Consultations

- Initial sensitization sessions across SAPZ-host communities
- Periodic review meetings (quarterly and annually)
- Gender-sensitive group discussions to amplify the participation of women and youth

Field Days and Demonstrations

- Practical demonstrations of IPM techniques, including pest trapping, correct use of personal protective equipment (PPE), and manual pest control methods
- Showcasing successful IPM adopters and lead farmers.

Mass Communication

- Local Radio Campaigns: Pest alerts, safe pesticide handling messages, and interactive call-in programmes
- Drama and Folk Media: Use of culturally appropriate theatre and performances in local languages
- Information, Education and Communication (IEC) Materials: Posters, flyers, manuals, and visual guides in English and local languages, including pictorial tools for semi-literate farmers

Digital Feedback Mechanisms

- SMS short codes and voice-based platforms for pest reporting and enquiries
- WhatsApp support groups for extension agents, agro-dealers, and community focal persons

These approaches enhance awareness, simplify IPM concepts, and strengthen feedback loops for adaptive pest management.

9.5 Inclusion and Equity Strategy

Inclusive engagement is a core principle of this PMP. Specific strategies are incorporated to ensure equitable access to pest management knowledge and resources for vulnerable and marginalized groups.

Gender Mainstreaming

- Minimum of 40% female participation in all capacity-building activities
- Targeting female-headed farms for pest surveillance and biological control interventions
- Collaboration with the Ogun State Ministry of Women Affairs and Social Development

Youth Empowerment

- Training rural youth as IPM Scouts and Pest Surveillance Officers
- Linking youth-led agribusiness and agro-input hubs to advisory and extension services

Social Safeguards

- Respect for cultural norms in pesticide storage and application practices
- Prohibition of child labour in all pest management activities, with no person under the age of **18 years** permitted to participate in pesticide handling, mixing, application, storage, or other hazardous pest management operations; Integration of dispute resolution and feedback processes into the Ogun SAPZ Grievance Redress Mechanism (GRM), in line with the Stakeholder Engagement Plan (SEP)

9.6 Engagement Schedule and Institutional Responsibilities

Stakeholder engagement activities will be implemented according to the schedule outlined in Table 9.2.

Table 9.2: Engagement Activities, Frequency and Responsible Institutions

Activity	Frequency	Lead Institution
Stakeholder Sensitization	Bi-annually	Ogun State Ministry of Agriculture
Radio Pest Alerts	Weekly (during growing season)	ADP and Local FM Stations
Community Demonstration Days	Quarterly	ADP and Partner NGOs

IPM WhatsApp Support Forums	Continuous	ADP Extension Desk
Annual Stakeholder Review Forum	Annually	Ogun SAPZ Steering Committee

9.7 Monitoring of Stakeholder Engagement

Stakeholder engagement performance will be tracked using an Engagement Monitoring Matrix capturing:

- Number of stakeholders engaged, disaggregated by gender and youth
- Types of engagement methods employed
- Stakeholder satisfaction levels obtained through feedback tools
- Evidence of stakeholder inputs integrated into PMP updates

Monitoring results will be reported quarterly through SAPZ implementation reports and information-sharing platforms.

9.8 Stakeholder Engagement and Consultation Evidence

Stakeholder consultations formed an integral part of the PMP preparation for the Ogun SAPZ Agricultural Transformation Centre (ATC). In line with AfDB requirements, consultations were evidence-based and documented, including venues, dates, participant categories, grievance redress arrangements, and indicative consultation costs (in United States Dollars).

Consultations were conducted between 19 November and 4 December 2025 in Ogun State. Key sessions included:

- i. Initial sensitization meeting with Local Government representatives, farmers' cooperatives, and community leaders on 22 November 2025 (Plates 1 and 2).
- ii. Stakeholder scoping workshop held at the Ijebu Mushin Palace Hall on 24 November 2025 (Plate 3).

These consultations were carried out in accordance with the AfDB Integrated Safeguards System, the World Bank Environmental and Social Framework, and Nigeria's participatory development principles.

9.8.1 Stakeholder Groups Consulted

Stakeholder consultations were designed to capture the full spectrum of actors involved in, or affected by, pest management under the Ogun State Special Agro-Industrial Processing Zone (SAPZ) Agricultural Transformation Centre (ATC). The consultations

covered diverse stakeholder groups, reflecting the multi-sectoral and multidisciplinary nature of integrated pest management.

The stakeholder groups consulted included:

- i. Smallholder farmers engaged in priority value chains (cassava, rice, cocoa, timber and vegetable production)
- ii. Women's cooperatives and youth associations involved in agricultural production and processing
- iii. Agro-dealers and private input suppliers
- iv. Agricultural extension officers from the Ogun State Agricultural Development Programme (ADP)
- v. Regulatory and oversight agencies, including representatives of NAFDAC, Ministry of Agric, OGADEP, and the Ogun State Ministry of Environment
- vi. Academic and research institutions, including relevant universities and agricultural research centres (e.g. IITA and FUNAAB)
- vii. Relevant Ministries, Departments, and Agencies (MDAs) involved in agriculture, environment, and public health
- viii. Development partners and project representatives, including the African Development Bank (AfDB) and the Ogun SAPZ coordination team

This inclusive approach ensured that diverse perspectives, indigenous knowledge systems, technical expertise, regulatory concerns, and potential environmental and social risks were adequately captured during PMP preparation.

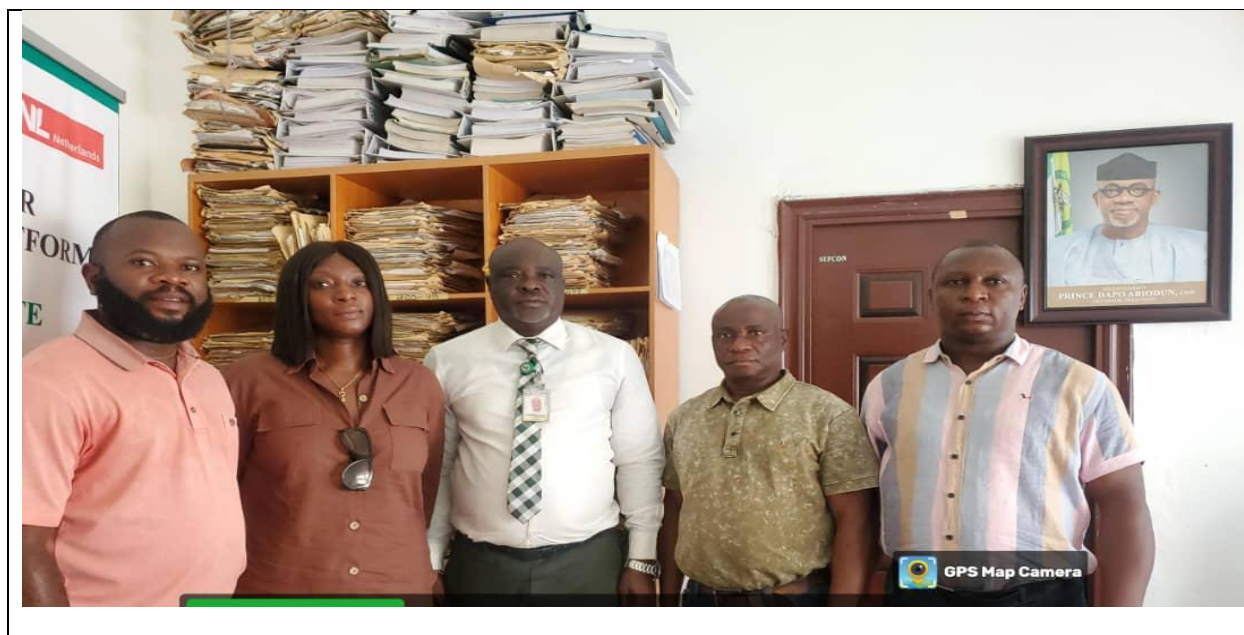




PLATE 9.1 STAKEHOLDERS ENGAGEMENT WITH OGUN STATE MINISTRY OF ENVIRONMENT AND MINISTRY OF AGRIC.





Plate 9.2: Public Engagement with Stakeholders at Sawonjo-Imasayi settlement prior to commencement of field exercise.





Plate 9.3: Cross sections of participants at the stakeholders engagement/scoping workshop, OGUN-SAPZ Rep.(middle)); Traditional leaders, women, youths among other stakeholders.





Fig 9.4: Stakeholder Consultation with Men, Women and Youth representatives of Iwaya, Ijebu Mushin, Itele and other surrounding communities





Fig 9.5: Consultation with Traditional heads of Ijebu Mushin, Itele and Iwaya prior the commencement of field Exercise.

9.8.2 Documentation of Consultations

All consultation activities were formally documented to meet AfDB safeguard and disclosure requirements and to ensure transparency and traceability. Documentation generated during the consultation process included:

- i. Attendance registers detailing participant names, affiliations, and contact information
- ii. Detailed minutes of meetings and workshop proceedings
- iii. Photographic evidence, including images of discussions, group sessions, and formal presentations
- iv. Copies of consultation and workshop materials, such as presentations, handouts, and PMP information sheets
- v. Consultation summaries shared with participants and relevant institutions

Table 9.4: Summary of Stakeholder Consultations Conducted for the Ogun SAPZ PMP (25 November – 10 December 2025)

Stakeholder Group	Venue / Location	Stakeholder Category	Number of Participants	Key Issues Raised	Response / Commitment Provided

Imasayi-Sawonjo & Ijebu Itele	Sawonjo Farm House and Imasayi Farm Estate	Smallholder Farmers / Cooperatives	Male: __23 Female: __9 Total: 31__	Need for safer pesticide alternatives and farmer training on IPM	PMP includes Farmer Field Schools and IPM-focused capacity building activities
Imasayi-Sawonjo & Ijebu Itele	Sawonjo Farm House and Imasayi Farm Estate	Women and Youth Groups	Male: __15 Female: __9 Total: __24	Request for inclusion in pest surveillance and training programmes	Women and youth integrated into FFS, pest scouting, and IPM extension activities
Imasayi-Sawonjo & Ijebu Itele	Palace of Ijebu Mushin Oba and Ogbadagbada Palace	Traditional Leaders / Community Representatives	Male: __8 Female: __2 Total: __10	Concerns regarding chemical exposure and environmental safety	PMP promotes non-chemical pest control and restricts hazardous pesticide use
Ministry of Environment. Ministry Of Agriculture and food security (Ogun State)	Secretariat	Government MDAs / Extension Officers	Male: __8 Female: __4 Total: __12	Need for improved institutional coordination and extension support	SAPZ coordination platform and ToT programmes incorporated into PMP
Mosafejo Agrochemicals, Imasayi Kenedy store, Ijebu Mushin	Respective agrochemical store at Imasayi and Ijebu Mushin	Agro-Dealers / Input Suppliers	Male: __ Female: __ Total: __	Concerns about counterfeit agrochemicals in circulation	PMP promotes procurement from approved/registered agro-dealers only

9.9 Integration of Grievance Redress Mechanism (GRM)

The PMP is fully integrated with the Grievance Redress Mechanism (GRM) established under the Stakeholder Engagement Plan (SEP) for the Ogun SAPZ project. The GM provides an accessible, transparent, and structured channel through which stakeholders can raise concerns related to pest management activities, pesticide use, health and safety, or environmental impacts.

Key features of the grievance redress mechanism include:

- i. Multiple access points, including community meetings, suggestion boxes at ATC and project sites, and SMS/WhatsApp communication lines
- ii. A three-tier grievance resolution process consisting of:
 - Community-level resolution through farmer groups or local committees
 - Escalation to the ADP/IPM coordination unit if unresolved
 - Referral to the Ogun SAPZ Grievance Redress Committee for final resolution
- iii. Clearly defined timelines, with acknowledgement of grievances within 48 hours and resolution targeted within 30 days
- iv. Confidential handling of complaints and protection of complainants from retaliation
- v. Systematic documentation, monitoring, and reporting of grievances in quarterly PMP implementation reports

The integration of the GRM ensures that stakeholder concerns are addressed promptly and that farmer and community voices remain central to PMP implementation, thereby strengthening accountability and trust.

9.11 Costing of Stakeholder Engagement (USD)

In line with the TOR and AfDB requirements, stakeholder engagement activities were costed to ensure adequacy of resources and financial transparency. Estimated costs are summarized in Table 9.5. Exchange Rate Applied: USD 1 = ₦1,450 (Applicable CBN Rate as of December 2025).

Table 9.5: Estimated Budget for Stakeholder Engagement Implementation

S/N	Budget Item	Estimated Cost (USD)	Estimated Cost (₦)
i	Community consultations (venue hire, logistics, refreshments)	6,434.48	9,330,000
ii	Technical workshops and stakeholder roundtables	10,724.14	15,550,000
iii	Documentation and disclosure (printing, translation, photography)	2,681.03	3,887,500
iv	Grievance mechanism operations (hotlines, suggestion boxes, reporting tools)	5,898.28	8,552,500
v	Monitoring and reporting (surveys, M&E personnel and tools)	4,289.66	6,220,000
Total		30,027.59	43,540,000

These costs are incorporated into the overall PMP budget and will be financed through AfDB project resources alongside counterpart funding from Ogun State.

9.12.1 Conclusion

The stakeholder engagement process for the Ogun SAPZ ATC PMP demonstrates full compliance with AfDB safeguard requirements by providing clear evidence of stakeholder coverage, consultation documentation, grievance mechanism integration, and costing in United States Dollars. By embedding participatory processes, transparency, and accountability into PMP preparation and implementation, the project ensures that pest management interventions are technically robust, socially inclusive, and environmentally sustainable. This approach enhances stakeholder ownership and supports the long-term effectiveness of pest management under the Ogun SAPZ programme.

SECTION 10: BUDGET AND FINANCING

Adequate budgeting and sustainable financing are critical to the effective implementation of this Pest Management Plan (PMP) for the Ogun State Special Agro-Industrial Processing Zone (SAPZ) Agricultural Transformation Centre (ATC). A well-costed PMP ensures continuity of pest surveillance, prevention, and control measures, while strengthening accountability, scalability, and long-term institutional ownership.

This section presents the estimated costs, funding sources, and financial accountability arrangements for PMP implementation. The budgeting framework adopts an activity-based and results-based financing (RBF) approach, consistent with African Development Bank (AfDB) and World Bank operational principles, whereby expenditures are linked to measurable pest management outputs and outcomes.

The total estimated budget for implementation of the PMP is ₦80,630,000 (Eighty Million, Six Hundred and Thirty Thousand Naira), equivalent to US\$55,606.90 (Fifty-Six Thousand, Six Hundred and Six United States Dollars and Ninety Cents), based on the exchange rate of ₦1,450 to US\$1.00. This budget covers surveillance infrastructure, training and capacity building, procurement of pest management inputs, monitoring and evaluation activities, awareness and stakeholder engagement programmes, as well as contingency provisions to support adaptive implementation throughout the project lifecycle.

10.1 Cost Estimates

A preliminary cost assessment was undertaken using activity-based costing methods. PMP implementation costs are grouped into five major components:

- (i) Surveillance infrastructure,
- (ii) Training and capacity building,
- (iii) Procurement of pest management inputs,
- (iv) Monitoring, reporting and evaluation, and
- (v) Public engagement and awareness.

Detailed cost breakdowns are presented in **Tables 10.1–10.4**, while **Table 10.5** provides the consolidated budget summary.

Table 10.1: Surveillance Infrastructure

Item	Unit Cost (₦)	Quantity	Total (₦)	Unit Cost (US\$)	Total (US\$)
Pheromone traps	8,000	120	960,000	5.51	662.07
Sticky traps	3,000	200	600,000	2.06	413.79
Mobile pest reporting devices	75,000	20	1,500,000	51.72	1,034.48
GIS mapping software & licences	1,200,000	1	1,200,000	827.59	827.59
Subtotal			4,260,000		2,937.93

Table 10.2: Training and Capacity Building

Activity	Budget (₦)	Budget (US\$)
Farmer Field Schools (FFS) across 10 wards	2,500,000	1,724.14
IPM Training of Trainers (30 extension agents)	1,800,000	1,241.38
Safety and PPE workshops	900,000	620.69
Training manuals (local languages)	500,000	344.83
Subtotal	5,700,000	3,931.04

Table 10.3: Procurement of Pest Management Inputs

Item	Budget (₦)	Budget (US\$)
Biocontrol agents (e.g. <i>Trichogramma</i>)	2,000,000	1,379.31
Neem-based botanical pesticides	1,000,000	689.66
Personal Protective Equipment (PPE)	1,500,000	1,034.48
Storage sanitisation kits	800,000	551.72
Emergency spill response kits	4,000,000	2,758.62
Hermetic storage bags	2,500,000	1,724.14
Retrofitting of storage facilities	3,000,000	2,068.97
Subtotal	14,800,000	10,206.90

Table 10.4: Monitoring, Reporting and Evaluation (MRE)

Activity	Budget (₦)	Budget (US\$)
Quarterly supervisory field visits	600,000	413.79
Printing of monitoring templates and data sheets	200,000	137.93
External mid-term evaluation	1,000,000	689.66
Annual review workshop	1,200,000	827.59
Subtotal	3,000,000	2,068.97

Table 10.5: Public Engagement and Awareness

Activity	Budget (₦)	Budget (US\$)
Radio jingles and IPM talk shows (3 stations)	600,000	413.80
Stakeholder sensitization forums	900,000	620.69
Youth and women inclusion campaigns	500,000	344.83
Subtotal	2,000,000	1,379.32

Table 10.6: Consolidated Budget Summary

Component	Estimated Budget (₦)	Budget (US\$)
Surveillance Infrastructure	4,260,000	2,937.93
Training & Capacity Building	5,700,000	3,931.04
Inputs Procurement	14,800,000	10,206.90
Monitoring & Evaluation	3,000,000	2,068.97
Awareness & Engagement	2,000,000	1,379.32
Stakeholders Engagement Implementation	43,540,000	30,027.57
Subtotal	73,300,000	50,551.72
Contingency (10%)	7,330,000	5,055.17
Grand Total	80,630,000	55,606.90

Note: Budget estimates are indicative and based on 2025 market prices using CBN parallel rate of December 2025 of N1,450 to 1 dollar. Final costs will be refined during detailed implementation planning and remain subject to inflation and exchange-rate variations.

10.2 Funding Sources and Disbursement Arrangements

Implementation of the PMP will be financed primarily through African Development Bank (AfDB) support under the Ogun SAPZ programme, complemented by government and partner contributions. Funding sources include:

- SAPZ Project Financing Envelope: Co-financed by AfDB and the Federal Government of Nigeria, with PMP costs embedded within ESMP, agricultural services, and infrastructure development budget lines.
- Ogun State Government Counterpart Funding: Annual budgetary allocations through the State Ministry of Agriculture and relevant MDAs under agricultural biosecurity, extension, and environmental protection programmes.
- Development Partner Support: Technical and in-kind contributions from partners such as FAO and the International Institute of Tropical Agriculture (IITA), particularly for biocontrol deployment and IPM research.
- Private Sector Participation: Agro-processors and agribusinesses operating within the SAPZ will be encouraged to co-finance pest management measures on out-grower farms through contract farming and public-private partnership (PPP) arrangements.

10.3 Financial Management and Accountability

To maintain transparency, fiduciary integrity, and donor confidence, the following financial management arrangements will apply:

- PMP expenditures will be managed through the SAPZ Project Financial Management Unit (PFMU) in line with AfDB fiduciary guidelines.
- All disbursements will be linked to approved work plans, budgets, and verifiable implementation milestones in line with the results-based financing approach.
- Quarterly financial and physical progress reports will be submitted to the AfDB, Ogun SAPZ Steering Committee, and relevant oversight institutions.
- Periodic internal audits and spot field verifications will be conducted to confirm expenditure legitimacy and alignment with PMP activities.

10.4 Conclusion

The budgeting and financing framework presented in this section demonstrates that the Ogun SAPZ ATC PMP is financially realistic, results-oriented, and fully aligned with AfDB safeguard and fiduciary requirements. By integrating PMP costs into core SAPZ financing structures and promoting co-financing and private sector participation, the Plan ensures long-term sustainability, accountability, and effectiveness of pest management interventions.

SECTION 11: MONITORING AND EVALUATION

Monitoring and Evaluation (M&E) form the backbone of adaptive pest management under this Pest Management Plan (PMP) for the Ogun State Special Agro-Industrial Processing Zone (SAPZ) Agricultural Transformation Centre (ATC). A robust and dynamic feedback mechanism ensures that pest management interventions are not only implemented and documented but are continuously assessed for effectiveness, efficiency, and responsiveness to evolving agro-ecological conditions.

This section outlines the PMP monitoring and evaluation (M&E) framework, performance indicators, reporting protocols, and review mechanisms, consistent with African Development Bank (AfDB) Operational Safeguards OS1 (Assessment and Management of Environmental and Social Risks and Impacts), OS3 (Pollution Prevention and Resource Efficiency), and OS5 (Labour, Working Conditions and Occupational Health and Safety), as well as FAO Integrated Pest Management (IPM) evaluation standards.

11.1 Indicators for Performance Measurement

To assess implementation progress and support evidence-based decision-making, a set of Key Performance Indicators (KPIs) will be monitored at defined intervals. These indicators capture technical effectiveness, environmental safety, social acceptance, and institutional performance. The indicators are summarized in Table 11.1.

Table 11.1: PMP Performance Indicators

Indicator	Unit of Measure	Data Source	Frequency	Responsible Institution
Pest incidence in major crops	% reduction from baseline	Field surveys, farmer reports	Quarterly	ADP, Ministry of Agriculture
Volume of chemical pesticides procured	Litres / kg	Agro-dealer records, NAFDAC data	Quarterly	Ministry of Agriculture, NAFDAC
Reduction in chemical pesticide use	% reduction vs baseline	Farmer surveys, sales records	Bi-annual	MoA, MoEnv/OGEPA, ADP
Farmers trained on IPM	Number trained	Training registers, FFS records	Quarterly	MoA, ADP
Adoption of IPM practices	% of trained farmers	Extension monitoring reports	Bi-annual	ADP, MoA

Grievances resolved	% resolved within timeline	GRM records	Quarterly	SAPZ Steering Committee
Pesticide-related health incidents	Number of cases	Health facility records	Bi-annual	Ministry of Health, MoA
Residue levels in soil and water	mg/kg, ppm	Laboratory analysis	Quarterly	MoEnv, NESREA
Compliance with PPE use (Target: Minimum 80% compliance among trained farmers and pesticide handlers)	% compliance	Field inspections	Quarterly	ADP, MoA
Post-harvest pest losses	% reduction	Storage inspections, farmer reports	Bi-annual	MoA, ADP

These indicators collectively enable assessment of the PMP's technical performance, environmental integrity, and social safeguards compliance.

11.2 Reporting System and Data Management

A structured reporting framework ensures systematic data collection, harmonization, and timely decision-making across institutional levels.

Routine Reporting

- Standardized monthly monitoring reports will be completed by extension officers and field technicians.
- Data will be uploaded to a centralized PMP Monitoring Dashboard at the SAPZ level.

Standard Reporting Templates capture:

- Pest type and severity
- Date and location (GPS-enabled where applicable)
- Pest control method applied
- Observed effectiveness and farmer feedback

Templates are available in both paper-based and mobile formats to ensure accessibility in low-connectivity areas.

11.3 Institutional Roles in Monitoring and Reporting

Roles and responsibilities for PMP monitoring and reporting are summarized in **Table 11.2**.

Table 11.2: Institutional Roles in PMP Monitoring and Reporting

Actor	Responsibility
ADP Extension Agents	Primary field data collection, farmer engagement, pest surveillance, and field reporting
ATC Environmental, Health and Safety (EHS) Officer	Day-to-day monitoring of PMP compliance at ATC level, incident documentation, regulatory coordination, and internal reporting
Ministry of Agriculture / Ogun MoAFS	Data validation, technical supervision, and consolidation of state-level PMP reports
Ministry of Environment / OGEPA	Environmental compliance inspections and environmental monitoring/reporting
NAFDAC	Oversight of pesticide registration compliance, approved product monitoring, and agrochemical regulatory enforcement
NESREA	Monitoring of hazardous waste management, pollution control, and environmental compliance relating to pesticide handling/disposal
SAPZ Steering Committee / PCU	Strategic review, safeguards oversight, coordination, and donor/lender reporting

Monthly and quarterly data are aggregated within the PMP Dashboard, enabling real-time visualization of pest trends, pesticide usage, and compliance status.

11.4 Periodic Review and Evaluation

Monitoring outputs inform periodic reviews aimed at improving PMP effectiveness through adaptive management.

Annual PMP Review Workshops

- Convened by the **Ogun SAPZ Steering Committee**
- Participants include relevant MDAs, ADP staff, farmer representatives, agro-processors, research institutions, and NGOs
- Key outputs include:
 - Revision of pest action thresholds
 - Updating of standard operating procedures (SOPs)

- Updating pest profiles and early-warning alerts, including emerging or invasive species

2 AfDB Supervision and Implementation Support Missions

- Periodic supervision missions shall be undertaken by the African Development Bank (AfDB) as part of project implementation oversight and safeguards compliance monitoring;
- Missions shall review PMP implementation performance, compliance with applicable safeguard requirements, budget utilization, and institutional effectiveness;
- Findings and recommendations from supervision missions shall be integrated into corrective action plans and subsequent PMP updates.

Mid-Term and End-Term Evaluations

- Conducted by an independent third-party evaluator (e.g. accredited consultancy or research institution)
- Evaluation focus areas include:
 - Cost-effectiveness of pest management interventions
 - IPM knowledge retention and adoption among farmers
 - Institutional performance and budget utilization

These reviews and evaluations mechanisms promote transparency, learning, and continuous improvement while supporting sustained donor confidence.

11.5 Integration with ESMP

PMP monitoring data will be integrated into the broader Environmental and Social Management Plan (ESMP) for the Ogun SAPZ to ensure coherence with environmental safeguards, occupational health requirements, and stakeholder engagement processes.

Monitoring Flow Structure

- i. Farm level – Weekly pest data collection by extension agents and FFS participants
- ii. LGA level – Data collation by ADP zonal officers
- iii. State level – Review by Ministries of Agriculture and Environment
- iv. SAPZ Steering Committee – Monthly analysis and strategic guidance
- v. Donor level – Annual narrative and financial reporting to AfDB and other partners

11.6. CONCLUSION

The Pest Management Plan (PMP) for the Ogun State SAPZ Agricultural Transformation Centre (ATC) provides a comprehensive and operational framework for addressing pest risks that threaten agricultural productivity, food safety, and environmental sustainability. The Plan identifies priority pest risks affecting key value chains – including cassava, rice, cocoa, timber, oil palm and stored produce – and recognizes that unmanaged pest pressures can result in yield losses ranging from 15–40%, with adverse implications for farmer incomes and market competitiveness.

To mitigate these risks, the PMP adopts a robust Integrated Pest Management (IPM) approach that prioritizes preventive, ecological, and economically viable measures. These include crop rotation, resistant varieties, habitat management, biological control, proper storage hygiene, and targeted farmer capacity building. Chemical pesticides are treated strictly as a last-resort option, with explicit exclusion of Highly Hazardous Pesticides (HHPs) and WHO Class Ia/Ib products. Only NAFDAC-approved, low-toxicity formulations are permitted under clearly defined action thresholds.

Clear institutional roles are established to ensure coordinated implementation. Farmers and cooperatives serve as frontline adopters of IPM practices; ADP extension officers lead training, surveillance, and digital reporting; the Ministry of Agriculture provides technical oversight; the Ministry of Environment ensures environmental compliance; and the SAPZ Steering Committee consolidates reporting and provides governance oversight to development partners, including AfDB.

Implementation of the PMP is supported by a dedicated budget of ₦55,606.90 million (approximately USD 80,630,000), covering surveillance infrastructure, training, IPM inputs, monitoring and evaluation, and public engagement. The results-based financing approach links expenditures directly to verifiable outputs and measurable performance indicators.

Monitoring commitments are embedded throughout the PMP via quarterly field inspections, residue testing, adoption surveys, grievance tracking, and annual stakeholder reviews. Continuous feedback and adaptive management mechanisms ensure that pest management interventions remain relevant, effective, and responsive to changing conditions.

In conclusion, the Ogun SAPZ ATC PMP demonstrates full alignment with the AfDB Integrated Safeguards System, particularly Operational Safeguard 3 on pollution prevention and resource efficiency, as well as the World Bank ESS3 and FAO IPM principles. Through this alignment, the PMP supports climate-smart, inclusive, and environmentally sound agricultural transformation in Ogun State, while safeguarding human health, ecosystems, and long-term project sustainability.

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ANNEXES

ANNEX A

Integrated Procedure for Pest Detection and Analysis

Pest detection under the Ogun SAPZ Agricultural Transformation Centre (ATC) adopts an integrated, multi-tiered approach combining field-based surveillance, farmer-led monitoring, laboratory diagnostics, agro-climatic analysis, and geospatial tools. This approach ensures early detection, validation, and response to pest outbreaks while avoiding over-reliance on GIS or satellite imagery alone.

The pest detection system operates at farm, cluster, LGA, and state levels, consistent with FAO Integrated Pest Management (IPM) principles and AfDB safeguard requirements.

A1. Framework for Pest Detection

Pest detection relies on five complementary methods:

1. Field-Based Visual Surveillance
2. Trap-Based and Semi chemical Monitoring
3. Farmer Reporting and Participatory Surveillance
4. Laboratory and Diagnostic Support
5. Geospatial and Remote Sensing Analysis (Support Tool, not sole method)

This integrated framework enables triangulation of observations, reducing false positives and improving decision accuracy.

A2. Field-Based Visual Surveillance

Routine field scouting forms the primary pest detection method.

Key activities include:

- Systematic crop inspection following standard scouting patterns (e.g., “W” or “Z” walk)
- Leaf, stem, root, and canopy examination
- Counting pest populations per plant, per leaf, or per unit area
- Recording crop growth stage and visible stress symptoms

Indicators observed:

- Chewing damage, wilting, tunneling

- Presence of eggs, larvae, nymphs, or adults
- Disease vectors and symptoms linked to pest infestation

Visual surveillance is conducted weekly or bi-weekly by ADP extension agents, trained farmers, and FFS participants.

A3. Trap-Based and Semiochemical Monitoring

Physical and baited traps are used to detect pests not easily observed visually.

Common tools include:

- Pheromone traps (e.g., stem borers, moths)
- Sticky traps (whiteflies, thrips)
- Light traps (nocturnal insects)
- Pitfall traps (soil-dwelling pests)

Trap counts provide **quantitative early-warning signals**, particularly useful for timing interventions before economic thresholds are exceeded.

A4. Farmer Reporting and Participatory Surveillance

Farmers are recognized as **first-line pest sentinels**.

Mechanisms include:

- Farmer Field School (FFS) observations
- Rapid reporting to extension officers via:
 - Logbooks
 - Mobile phones / WhatsApp groups
 - Scheduled farm visits
- Community pest alerts during outbreak periods

Participatory surveillance improves timeliness, coverage, and local knowledge integration, especially where technical monitoring is limited.

A5. Laboratory and Diagnostic Support

Where visual or trap data are inconclusive, **laboratory confirmation** is applied.

Diagnostic methods include:

- Microscopic pest identification

- Pathogen isolation (fungal, bacterial, viral vectors)
- Soil and plant tissue analysis
- Residue and toxicity testing (where chemical exposure is suspected)

Laboratory support is provided through accredited research institutions, plant health laboratories, or universities as required.

A6. Agro-Climatic and Environmental Monitoring

Pest occurrence is strongly influenced by environmental conditions.

Supporting indicators include:

- Rainfall patterns and dry spells
- Temperature and humidity trends
- Cropping calendar alignment
- Irrigation and drainage conditions

Agro-climatic data are used to anticipate pest emergence periods and strengthen early warning systems.

A7. Geospatial and Remote Sensing Support Tools

Remote sensing and GIS are used as supplementary decision-support tools, not as standalone detection methods.

Vegetative Stress Detection

Plants under pest attack may exhibit:

- Reduced chlorophyll content
- Altered canopy structure
- Disrupted transpiration patterns

These physiological changes affect spectral reflectance.

Spectral Indicators

- Visible Bands (RGB): Reduced greenness due to chlorophyll loss
- Near-Infrared (NIR): Reduced reflectance under stress
- Thermal Infrared: Elevated canopy temperature from reduced transpiration

Remote Sensing Indices

- NDVI (Normalized Difference Vegetation Index)
 - Detects changes in plant vigour and canopy health
- VCI (Vegetation Condition Index)
 - Compares current vegetation condition against historical norms

A8. NDVI-Based Vegetation Assessment (Supportive Analysis)

NDVI is applied to:

- Monitor general vegetation health
- Identify spatial stress patterns
- Support field verification efforts

NDVI Formula:

$$NDVI = \frac{(NIR - Red)}{(NIR + Red)}$$

NDVI trends are interpreted **only after ground validation**, recognizing that vegetation stress may also result from drought, nutrient deficiency, or disease.

A9. Vegetation Condition Index (VCI)

VCI highlights **anomalous stress conditions** relative to historical baselines.

$$VCI = \frac{NDVI_{current} - NDVI_{min}}{NDVI_{max} - NDVI_{min}} \times 100$$

VCI supports **risk zoning**, prioritizing field inspections and intervention planning.

A10. Pest Vulnerability and Risk Analysis

Pest risk assessment integrates multiple suitability factors, including:

- Field-observed pest incidence
- Vegetation condition (NDVI/VCI)
- Crop type and growth stage
- Soil characteristics and drainage
- Elevation and slope
- Historical pest occurrence

The Analytic Hierarchy Process (AHP) is applied to weight these factors, ensuring consistency and reduced subjectivity in vulnerability mapping.

A11. Pest Detection and Response Workflow

1. Initial Detection
 - Visual scouting, traps, or farmer reports
2. Confirmation
 - Extension verification and threshold comparison
3. Supplementary Analysis
 - Agro-climatic review and GIS support (if needed)
4. Decision-Making
 - IPM-based intervention selection
5. Monitoring and Feedback
 - Post-intervention assessment and reporting

Key Principle

GIS and satellite imagery enhance pest surveillance but do not replace field-based IPM practices. All remote sensing outputs must be verified through on-site inspection before management decisions are made.

ANNEX B: ATTENDANCE



Special Agro-Industrial Processing Zones Programme
DRAFT STATE POLICY ON AGRICULTURE FOR FOOD SECURITY

ATTENDANCE SHEET

ACTIVITY: _____ LOCATION: Sawonjo DATE: 18/11/25

S/N	Name	Designation	Profession	Gender	29 Years and Below	Above 29 Years	Email/ID Number	Telephone	Signature
1	Ailbade-walun	Boke	Farmer	M	☐	☒	5358974374	090316050	[Signature]
2	AKINDE SARUNYU	Boke	CARPENTER	M	☐	☒	7298039635	080320546	[Signature]
3	TALUO-SAMUEL-ADESINA	Boke	PROPHET	M	☐	☒	29966724972	0806298954	[Signature]
4	IBIKUNLE HARUNA-ALANI		Farmer	M	☐	☒	43764930713	0706847448	[Signature]
5	AKIYANADE OLUKUNDA A.	Chief	Farmer	M	☐	☒	52069476684	0903570905	[Signature]
6	Olatunji David Mantunda				☐	☒	52308744664	08024161050	[Signature]
7	PAINE I.A. DUROJAYE	Prince			☐	☒	52227202542	08039788316	[Signature]
8	O'LAGBEMI RUFUS D.		Farmer	M	☐	☒	58639947284	0703665347	[Signature]
9	EDUN ABISUN		Farmer	M	☐	☒	56624179707	08107893947	[Signature]
10	ASOGBA OBALOYIN A		Farmer	M	☐	☒	438258202	08062778035	[Signature]
11	Alcambi A&L		Farmer	F	☐	☒	887	07064477871	[Signature]
12	Ajayi Basirat		Farmer	F	☐	☒	88740736576	070133258207	[Signature]
13	Odeye Toloni J		Farmer	F	☐	☒	3246785025	0703128392	[Signature]
14	Akande Bose Morenikeji		Farmer		☒	☐	1815667046	070660506	[Signature]



OGUN SAPZ PROJECT - PREPARATION OF ESIA, LRP, SEP & PMP

ATTENDANCES

LOCATION: Ministry of Agriculture

DATE: 04/11/25

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1.	ANIO FOLARIN	08027295200	Dept of Agric service / Ibadan	Ministry of Agriculture	Asst. Director	[Signature]
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3.	BAKARE O. O (MRS)	08033699334	Dept. of Agric Services / Ibadan	✓	Asst. Director	[Signature]
4.	ILEYANMI OLASELE	08035231888	✓	✓	Senior Agric officer	[Signature]
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6.	NKEM edemanya	07081714640	FCT Abuja	CREDO	LAP	[Signature]
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8/11/2025
Ogbadagbada palace



OGUN SAPZ PROJECT - PREPARATION OF ESIA, LRP, SEP & PMP

ATTENDANCES

LOCATION: IWAYA, IJEBU NORTH

DATE:

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5.	TITIHOPE POPOLU	08137805546	Iwaya	- ✓		[Signature]
6.	Abiodun Ewale	0702081019	Iwaya	- -	✓ ✓	[Signature]
7.	Okeowo Samu	08074151478	Iwaya	- -	-	[Signature]
8.	Bunkun Oguntimakin	08057435908	Iwaya	- -	-	[Signature]
9.	Rasheed Ogunfidewo	08033411612	Iwaya	- ✓	✓	[Signature]
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AFRICAN DEVELOPMENT
BANK GROUP

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Investing in rural people



Special Agro-Industrial Processing Zones Programme

DRUGS AND SUBSTANCE ABUSE PREVENTION AND FOOD SECURITY

ATTENDANCE SHEET

ACTIVITY: _____

LOCATION: Sawonjo

DATE: 18/11/25

S/N	Name	Designation	Profession	Gender	29 Years and Below	Above 29 Years	Email/ID Number	Telephone	Signature
1	Ajibade-waliu	Boke Farmer	m		☐	☒	53589743744	09033160510	
2	AKINDE SAROYU	Boke CARPENTER	m		☐	☒	7298039625	08032001420	
3	TAYO-SAMUEL-ADEGUNA	Boke PROPHET	m		☐	☒	2996672972	0806298954	
4	IBIKUNLE HARUNA-ALANI	Farmer	m		☐	☒	43764930713	07068474440	
5	AKIYINWADE OLUKUNDA A.	Chief Farmer	m		☐	☒	52069476684	0903509051	
6	Olatunji David Mantumbo	✓	✓	✓	☐	☒	52308744664	0804161050	Olatunji
7	PAUL I.A. DUROJAYE	Prince	✓	✓	☐	☒	52227202542	08039788516	PAUL
8	OLUGBEMI RUFUS D.	Farmer	m		☐	☒	53639947284	0703665347	
9	EDUN ABIDUN	Farmer	m		☐	☒	56624179707	08105893947	
10	ASOGBA OBALOYIN A	Farmer	m		☐	☒	438258202	08062778035	ASOGBA
11	Alkambi A&LIT	Farmer	F		☒	☐	887	07064477871	
12	Ajayi Basirat	Farmer	F		☐	☒	88740736576	08133258267	Ajayi
13	DeKeye Tolani J	Farmer	F		☐	☒	32467850325	0703128399	DeKeye
14	Alomola Bose Monokye	Farmer			☒	☐	1815667146	081640562	Alomola



ATTENDANCE SHEET

ACTIVITY: _____ LOCATION: Sawonjo DATE: 18/11/25

S/N	Name	Designation	Profession	Gender	29 Years and Below	Above 29 Years	Email/ID Number	Telephone	Signature
1	FAYOMI M.A	—	FARMER	M	☐	☒	83368955806	0816644392	[Signature]
2	MOYEDU Julius Amini	—	FARMER	M	☐	☒	10542582687	0806656444	[Signature]
3	Olunloye Lemi Isoro	—	FARMER	M	☐	☒	10035043385	0913073372	[Signature]
4	Ayinde Bisi	—	FARMER	F	☐	☒	74190873537	08147526116	[Signature]
5	ADEYEMI ATINDE	—	FARMER	M	☐	☒	21996074344	08161163439	[Signature]
6	OGUNJADE ISHAC	—	FARMER	M	☐	☒	45700727732	08061524261	[Signature]
7	ADENIYI RASHID A	Member	FARMER	F	☐	☒	14413294888	0703034144	[Signature]
8	PAULINA ADEYEMI	—	FARMER	F	☐	☒	99998575074	0704749651	[Signature]
9	Bamidele Azeed	✓	✓	✓	☐	☒	18010863437	0813939416	[Signature]
10	OGUNJADE ISHAC	✓	✓	✓	☐	☒	571412182969	0814758318	[Signature]
11	IBIKUNLE HAKIM	✓	✓	Male	☐	☒	309772283244	0812046074	[Signature]
12	IBIKUNLE MURITALA	✓	✓	✓	☐	☒	1774544817	0708806883	[Signature]
13	EGBUNGBI VICTORIA	Member	—	Female	☐	☒	8495398460	0813331903	[Signature]
14	BADMUS JELILI	✓	✓	Male	☐	☒		0808853793	[Signature]



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ATTENDANCES

LOCATION: IMASAYI DATE: 20/11/2025

S/N	Name	Phone No/Email	Address	Organization/Community	Position	Signature
1.	Isiolaji Bola Sylvester	08036720451	Imasayi	Min g p p c	estate officer	[Signature]
2.	LIJADI OLUNWAKEMISI P.	07039028132	-	-	-	[Signature]
3.	Leoto Timothy	08060488419	Imasayi	chairman		[Signature]
4.	Felolu Jacob A.	08062209389	"	farmer		[Signature]
5.	Odeunle Ajani	08139211279	"	✓		[Signature]
6.	Ojuekele Olamide	08089118923	"	✓		[Signature]
7.	AKERA Folokunso AAKA	08134524733	"	✓		[Signature]
8.	Ajayi Mulbat	08061272574	"	✓		[Signature]
9.	Johnson Mus	08072114544	"	✓		[Signature]
10.	Igini Lansi	08066514996	"	✓		[Signature]
11.	Oladeinde Babatunde A	08134116404	ABITA	HA/CRDO	RAP/LRP	[Signature]
12.	Nkem Edemang	0708714640	Ataya	✓	✓	[Signature]
13.	Ogundele malsbay	08038080426	Imasayi	farmer		[Signature]
14.	AKERA FUMILAYO	08103335132	✓	✓		[Signature]



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ATTENDANCES

LOCATION: Ministry of Agriculture DATE: 04/11/25

S/N	Name	Phone No/Email	Address	Organization/Community	Position	Signature
1.	ALIO FOLARIN	08027295200	Dept of Agric Services & Food Sec	Ministry of Agriculture	Asst. Director	[Signature]
2.	OGUNDINA A. A (MRS)	08033665086	Dept of Agric Service & Food Sec	✓	Asst. Director	[Signature]
3.	BAKARE O. O (MRS)	08033649334	Dept of Agric Services & Food Sec	✓	Asst. Director	[Signature]
4.	ILESANMI OLASELE	08035231838	✓	✓	Senior Agric Officer	[Signature]
5.	DR. A. A. JULIUS	07062295591	FCT Abuja	CREDO	ESIA Expert	[Signature]
6.	NKEM EDEMANYA	07081714640	FCT Abuja	CREDO	LAP	[Signature]
7.	GLADINDE BABATUNDE	08154116404	FCT Abuja	CREDO	LAP	[Signature]
8.	Desmond Oparin	08138551890	FCT Abuja	CREDO Calabar	ESIA & LAP	[Signature]
9.						
10.						
11.						
12.						
13.						
14.						