Kenya Climate Smart Agriculture Project

(KCSAP)

INTEGRATED PEST MANAGEMENT PLAN (IPMP) FOR COTTON VALUE CHAIN; LAMU COUNTY

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ACRONYMS AND ABBREVIATIONS

CDDC - Community driven development committee

CIG – common interest group

CPCU – County project coordination unit

ESMP – Environmental and Social Management Plan

HIV/AIDS – Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome

IPM – Integrated Pest Management

IPMP – Integrated pest management plan

KCSAP – Kenya Climate Smart Agriculture Project

MOA – Ministry of Agriculture (now day's department of agriculture at county level)

MSDS Material Safety Data Sheet

NEMA – National Environmental Authority

PCPB - Pest Control Products Board

PHI - Pre Harvest Interval

PMP – Pest Management Plan

PPEs – Personal Protective Equipment

SAIC - Social Accountability and Integrity Committee

SP – Service Provider

STI – Sexual Transmitted Infections

TIMPs – Technology innovation management practices

VMG – Vulnerable and Marginalized Group

EXCUTIVE SUMMARY

The Kenya Climate Smart Agriculture Project (KCSAP) is a Government of Kenya initiative supported by the World Bank. The project is a five-year project being implemented in 24 counties in the country, Kenya.

The Kenya Climate Smart Agriculture Project Development Objective is "to increase agricultural productivity and build resilience to climate change risks in the targeted smallholder farming and pastoral communities in Kenya, and in the event of an Eligible Crisis or Emergency, to provide immediate and effective response". The Project activities will contribute to these objectives by Up-scaling Climate-Smart Agriculture (CSA) Practices and supporting smallholder farmers to adopt integrated climate-smart Technology, Innovation and Management Practices (TIMPs).

In Lamu County, the project is implemented in 6 wards. Cotton value chain is implemented in three wards which includes Bahari, Hindi and Mkunumbi.

Cotton crop is prone to attack by pests mainly Jacids and spider mite. The cotton product losses its value in the market. There are several diseases that can affect cotton making it loses its market value.

KCSAP is an environmental Category B - Partial Assessment. This classification means that KCSAP interventions are likely to have negative environmental and social impacts, which are small in scale, site-specific, and largely reversible. Cotton farming activities will use integrated pest management as part of the management practise to mitigate potential environment impacts emanating from pest management measures.

Integrated Pest Management (IPM) is an ecosystem-based strategy that focuses on prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides will be used as a last option and according to established guidelines. Pest control materials will be selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms, and the environment. The methods that will be used in the cotton IPM will include environmental manipulation to render the environment unfavourable for pest survival. Biological & physical methods will be used to control pests. Chemical methods will be used as the last resort to control pest in cotton farming.

Reference was made to several regulations, acts and policies in development of this IPMP. The Kenya Constitution, 2010 in section 42, 67 & 70 talks of environment issues. Plant Protection Act (cap 324) makes a provision for the prevention of the introduction and spread of pests destructive to plants. Pest Control Products (CAP 346) which covers the use, application, importation and trade in pest products. It includes regulation on. Crops act of 2013 is fibre crop directorate which covers cotton as a fibre crop. There is a pest control protection regulations regarding registration, Labelling, Advertising and Packaging, Licensing of Premises & Disposal these regulations gave guide in coming up with the IPM and will guide in the implementation. There is also International Policies and Regulations on Use of Pesticides as Convention on Biological Diversity (1992), International Plant Protection Convention of FAO (1952), United Nations Framework Convention on Climate Change (1992) and World Bank Operational Policy on environmental assessment (OP 4.01) and Pest Management, OP 4.09.

The use of pesticides will have positive and negative environmental and social impacts. Purchase of pesticides will increase income to agrochemical supplies, stockists and producers. The possible negative impacts of pesticide include accidental spillage, leakages, and fumes during transportation, accidental poisoning of children, drift of pesticides to no target crops and species, and sexual exploitation and abuse that may arise from the grass root partners. These possible impacts will be mitigated through good transporting vehicles that are well covered to avoid spillage and escape of fumes, checking of the pesticides to ensure they rage in sealed and well labelled containers. Additional measures include proper storage of the pesticides, and conducting spraying during calm weather when there is are no strong winds. Grass root partners and the farmers will be sensitized on sexual exploitation and abuse issues during training session on cross cutting issues to the farmers. The farmers will apply the pesticides themselves and they will be trained on proper and safe application of pesticides and they will also be provided with PPEs.

The IPMP will be implemented at an estimated cost of Ksh. 2,838,020. Participatory monitoring will be done to the beneficiary (farmers) and at the farm. Effectiveness of various IPM techniques, Spray monitoring and efficacy assessment will be conducted in collaboration with KALRO. The use of pesticides to control cotton pests and diseases can be done as the negative environmental and social impacts will be mitigated by implementing the measures provided in this pest management plan.

1.0 INTRODUCTION:

Integrated pest management is an ecosystem-based strategy that focuses on prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms, and the environment.

Integrated Pest Management Plan (IPMP) is therefore a tool that is going to be used in the implementation of this cotton production value chain in Lamu County. KCSAP primarily focuses on supporting interventions aimed at increasing productivity and building resilience to climate change, with reduction of Greenhouse Gases (GHG) emissions as a potential co-benefit, where possible and appropriate.

1.1 Background of Cotton Production in Lamu County

Cotton crop is an important cash crop in Lamu County grown by small scale farmers. The crop is mainly grown in the mainland of Lamu West sub-county with over 80% concentrated in Mpeketoni area. There are about 5,000 ha under cotton mainly HART 89M variety that yields an average of 1500kg/Ha of seed cotton. Under good crop husbandry, however, the seed cotton yields over 2400kg/ha. This year Lamu County farmers planted hybrid cotton varieties like C567, C570, C571 and Hybrid BT cotton for demonstration purpose and up scaling in future.

The cotton grown in the County is 100% rain-fed and it is usually planted at the onset of the long rains of March – April. Harvesting happens in August – September and the peak is in the month of October. Ninety percent (90%) of the long rain seed cotton harvested is AR grade, the best quality in the country; the remaining ten percent is the BR quality grade which is harvested from the ratoon crop. Lamu County has high potential for both rain-fed and irrigated cotton production.

The local cotton production has faced a number of challenges including: inadequate quality cotton seeds, high cost of inputs especially in the management of pests and diseases, inefficient marketing channels, overdependence on rain-fed farming, among others.

Considering that the crop is given top priority in the Big Four Agenda under the pillar of manufacturing, mainly for provision of raw materials to the industries, the national government in collaboration with other stakeholders has strived to develop strategies to overcome these challenges. Among the interventions include introduction of new technologies in cotton production e.g. Bt cotton and other varieties, improvement of seed cotton marketing systems to motivate farmers, strengthening of cotton farmer's cooperatives and other marketing groups/ organizations, enhancing capacities for sustainable pest and disease management through use of integrated pest management (IPM), and promotion of partnerships within the cotton value chain.

1.2 Aims and objectives of the integrated pest management plan

The integrated pest management plan is aimed at bringing all the stakeholders on board so that they can participate fully in mitigating the negative impacts arising from pest management in cotton farms within KCSAP beneficiaries.

Specific objectives:

a) Establish clear procedures and methodologies for Integrated Pest Management planning, design, and implementation of activities to be financed under the Project.
b) Assess the potential environmental and social impacts of use of pesticides and associated activities.
c) Provide measures to mitigate negative impacts of pesticide use and associated activities.
d) Identify capacity needs and technical assistance for successful implementation of the IPMP.
e) Develop a monitoring and evaluation systems for the cotton pesticides use & management practices.
f) Prepare a budget required to implement the IPMP

1.3 Justification of Integrated Pest Management Plan

There are pests and disease in the project area where cotton growing is taking place. If the pests and the diseases are not managed through various methods; they may destroy the crops thereby reducing crop productivity and yield. This results in low earnings from cotton production. Additionally, invasion of pests like Jacids, spide mite and other cotton pests and diseases affects the market value of the product; thereby further reducing farmers' income. The Department of Agriculture and Irrigation of Lamu County has a duty to ensure the farmer's crops are protected from pests and diseases so that they can produce crops of high yields and quality, and which can be marketed internationally.

1.4 The following activities will be undertaken by Cotton farmers.

- Land preparation – farm clearing/slashing/burning, use of herbicide, tractor ploughing/oxen, manual/hand digging.
- Planting dressed cotton seeds.
- Fertilizer/manure application during planting stage.
- Application of foliar fertilizers for cotton
- Integrated Pest Management (IPM), which will include environmental manipulation, biological control, physical control and chemical application.
- Harvesting and marketing of cotton.
- Slashing of crop residues after harvesting.

These activities are detailed in annex 2 where the months of implementation are also indicated.

1.4.1 Equipping the Cotton Common Interest Groups

1. The cotton CIGs members are to be trained by the service provider on the use of IPM and proper use and application of pesticides.
2. The CDDCs will procure some demonstration equipment for cotton CIG members such as spray pumps and PPEs
3. The procured pesticides and equipment will be distributed to the CIGs members by the executive members of the CIG.
4. There will be capacity building of grass root partners as service providers and County Agricultural officers on IPM.

5. Carry out quarterly social and environmental audit. This will be conducted by the County Environmental and Social Safeguard Committee (CESSCO); this committee will appropriately engage with various stakeholders.

1.5 Pest Management Plan Preparation Methods

The PMP preparation involved environmental and social screening, gathering information from Key informants and mapping out stakeholders to get their views. There was stakeholder's engagement in the process of preparing this PMP. Stakeholders helped in identifying environmental and social risks related to the use of pesticides and potential mitigation measures. Below are the approaches used to prepare this PMP: -

1.5.1 Environmental and social risk Screening

Environmental and social screening was done where a checklist was administered to the cotton group members. The checklist screened both environment and the social risks. The screening checklist was the tool that gave information that led to preparation of IPM.

1.5.2 Mapping of stakeholders

Several stakeholders were involved in coming up with the pest management plan. The mapped stakeholders included farmers who will participate in the control of the pest and disease at the farms. They mentioned several ways of ensuring that pests and diseases are controlled at the farm level e.g. farmers will take part in scouting of the pests and identification of the disease affecting their cotton crop. Farmers will actively apply all methods that the Service Providers will inform them can be used for control of the pests and disease.

Six cooperatives officials were also approached and shared their ideas on the control of the pests and disease in the farms. They mentioned that cotton is prone to many pests and diseases which need to be addressed through several methods of control like pesticides application.

Agrochemical seller/ distributors premises were visited and the sellers/ distributors mentioned of the type of pesticides which can be used in the farms that have insignificant effect to the environment and what most farmers like to use. Four agrochemical premises were visited.

1.5.3 Key Informants

Some key informants gave information during the preparation of the PMP. Some of the informants included Agricultural Extension Field Officers, Agricultural County Crops Officer and local NEMA Officer.

Agricultural Extension Officers in the cotton growing zones gave information of the common type of pests and disease that affect the cotton crop that needs to be managed for a good yield. Three Agricultural Zonal Officers were involved in giving the information. The County Lead Cotton Officer in the department of agriculture gave information on the cotton background information and the chemicals preferred by most farmers. During screening Two NEMA Officer helped in the subjecting the questionnaire to the farmers, it's after this exercise where the officers gave some information which was useful during the preparation of the IPMP. They gave information on the ways of waste disposal. The way to dispose the used containers would be triple rinse, puncture them to render unusable then store in safe containers then hand they to AAK.

2.0 RELEVANT LEGAL, REGULATORY AND POLICY FRAMEWORK

2.1 NATIONAL POLICIES

2.1.1 The Kenya Vision 2030

The Sessional Paper Number 10 of 2012 on the Kenya Vision 2030 under the economic pillar identifies specific interventions which in the agricultural sector include increasing productivity of crops and livestock, introducing land use polices for better utilization of high and medium potential lands, developing more irrigable areas in arid and semi-arid lands for both crops and livestock, and improving market access for smallholders through better post-harvest and supply chain management. It also prioritizes flagship projects in the sector, specifically: enactment of the consolidated agricultural reform bill, fertilizer cost-reduction investment, disease-free zones, land registry, land-use master plan and arid and semi-arid lands development project. The Policy makes reference to climatic change and directs responses. The Policy under the social pillar, with respect to environmental management proposes to intensify conservation of natural resources, such as establishing voluntary carbon markets, intensify research on impact of and response to climatic change and pilot adaptation programmes.

2.2 Legal framework

2.2.1. The Kenya Constitution, 2010 (Constitution of Kenya 2010)

The Constitution, which was promulgated on the 27th of August 2010, takes supremacy over all aspects of life and activity in the Republic. With regard to environment, Section 42 of the Constitution states as follows: -

Every person has the right to a clean and healthy environment, which includes the right:

a) To have the environment protected for the benefit of present and future generations through legislative and other measures, particularly those contemplated in Article 69; and

b) To have obligations relating to the environment fulfilled under Article 70’

In Sections 69 and 70, the Constitution has inter alia identified National Obligations in respect to the environment and Enforcement of Environmental Rights respectively as follows: -

Section 69 (1): The State shall

a) Ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;
b) Work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya;
c) Protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities;
d) Encourage public participation in the management, protection and conservation of the environment;
e) Protect genetic resources and biological diversity;
f) Establish systems of environmental impact assessment, environmental audit and monitoring of the environment;
g) Eliminate processes and activities that are likely to endanger the environment; and
h) Utilize the environment and natural resources for the benefit of the people of Kenya.

Section 69 (2) States that; every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

Section 70 provides for enforcement of environmental rights thus:

> (1) If a person alleges that a right to a clean and healthy environment recognized and protected under Article 42 has been, is being or is likely to be, denied, violated, infringed or threatened, the person may apply to a court for redress in addition to any other legal remedies that are available in respect to the same matter.
>
> (2) On application under clause (1), the court may make any order, or give any directions, it considers appropriate:
>
> a) To prevent, stop or discontinue any act or omission that is harmful to the environment;
> b) To compel any public officer to take measures to prevent or discontinue any act or omission that is harmful to the environment; or
> c) To provide compensation for any victim of a violation of the right to a clean and healthy environment.

(3) For the purposes of this Article, an applicant does not have to demonstrate that any person has incurred loss or suffered injury

There are statutes that deal with pests and diseases directly and others that are indirectly connected with pest control and management. These include:

2.2.2 Chapter 324 – Plant Protection Act

This Act makes a provision for the prevention of the introduction and spread of pests destructive to plants. The most applicable parts of this Act to Integrated Pest Management are specified in Sec. 3, 4, 5, 6, 7 and 8. The act creates specific rules to support plant protection in various crops. This includes sugarcane (L.N.294/1962. Rule 3, Sch. 2), Maize and Sorghum (L.N.216/1956. Schedule (7 and 8), Sisal (L.N.522/1957, L.N.365/1964, L.N.153/1958, L.N.177/1959, L.N.558/1960) and Banana (Cap.178 (1948), Sub. Leg. L.N.365/1964).

This act will give powers to extension officer to advise the cotton farmers to destroy crops that have pests, if one resists the law can be used to force the farmers to destroy the crops.

2.2.3 Chapter 346: Pest Control Products

This Act covers the use, application, importation and trade in pest products. It includes regulation on:

- Prescribing for the purposes of this Act the nomenclature of pests, classes and kinds of pests and pest control products;
- Prescribing the form in which applications for registration shall be made and the information to be furnished therewith;
- Respecting the registration of pest control products and establishments in which any pest control products are and led by manufacturers or dealers and prescribing the fees therefore, and respecting the procedures to be followed for the review of cases involving the refusal, suspension or cancellation of the registration of any such product or establishment;
- Prescribing the form, composition, and all other standards relating to the safe use of pest control products, including toxic residue effects;

- Respecting the manufacture or treatment of any pest control product to facilitate its recognition by change in coloration or other means;

- Respecting the standards for efficacy and safety of any pest control product;

- Respecting the manufacture, storage, distribution, display and use of any pest control product;

- Respecting the packaging, labelling and advertising of pest control products;

- Respecting the taking of samples and the making of analyses for the purposes and provisions of this Act;

- Prescribing the information to be supplied and the form of such information in respect of any pest control product that is to be imported into Kenya;

  This act will be used to ensure that all the pesticides to be bought for the CIG groups are registered and allowed for use in Kenya and that pest control activities to be conducted as part of this PMP conform to this act.

2.3 REGULATIONS ON PESTICIDES

2.3.1 The Pest Control Products (Registration) Regulations, 1984

12 [L.N. 46/1984, L.N. 109/1984, L.N. 123/2006.] – defines the process of registering pest control products. Key features of the subsidiary legislation include:

- Section 5 - establishes the PCPB, whose functions include assessing and evaluating pest control products, and considering applications for the registration of pest control products. The pesticide to be used is registered for use in Kenya as per this regulation.
- Regulation 2 - provides definitions for various pest control products including biochemical pesticide and micro- and microbial bio pesticides
- Regulation 4 - outlines the procedure for the registration of pest control products including bio pesticide-specific registration pathways
- Regulation 7 - provides for instances when the PCPB can issue or refuse to issue a certificate of registration
- Regulation 8 - stipulates the validity period for certificates of registration
- Regulation 10 - lists instances where the PCPB may refuse to register a pest control product

- Regulation 11 - states instances where the PCPB may suspend or revoke a certificate of registration
- Regulation 14 - provides that a holder of a certificate of registration is to keep a record of all the quantities of pest control products they store, manufacture or sell. This record is to be maintained for five years from the time it is made and must be made available to the PCPB at such times and in such manner as the PCPB may require.

The PCPB publishes the list of pest control products registered in the country on its website. This list is published to stakeholders in the plant health sector in order to easily identify the pesticides that have been evaluated by the PCPB for safety, efficacy, quality and economic value. By accessing the PCPB website, any person can access categorized downloadable list of registered products, including those for use in crop production, animal health and public health. Contained in the list is information on trade names of products, their registration numbers, the name(s) of active ingredient(s) and their concentrations, formulation type, authorized uses including crops and target pests, the name of the registrant and the period of registration.

In addition, the document contains a separate list of banned products (Annex 1). The list of pesticides registered for use in Kenya was last updated in 2017 and contains more than 300 AI. A total of 1,244 products have been registered. Of these, 1,056 have been registered for use in crops, 128 for use in public health, and 40 for use in animal health. The list of banned products was last updated in 2017. This list contains 33 products comprising insecticides, fungicides, herbicides, miticides, nematicides, rodenticides, and soil fumigants. See Annex 11 of these PMP for pesticides that will not be used in cotton pest control.

The CDDC procurement members under the guidance of County Technical Departments (CTDs) and County Environmental and Social Safeguard Compliance Officer (CESSCO) will ensure the pesticides purchased for the CIGs follow these regulations. It's the duty of the CESSCO to ensure these regulations have been followed to the latter.

2.3.2 The Pest Control Products (Labelling, Advertising and Packaging) Regulations, 1984

[L.N. 89/1984, L.N. 127/2006.] – address the design of pesticide packages (packaging and labelling). Regulation 3 requires all pest control products to bear a label, which has been approved by the PCPB. In addition, the regulation specifies the information required on the

label. Regulation 9 provides for cases where the physical properties of a pest control product may not be recognized when it is being used. In such circumstances, the pest control product must be denatured by means of colour, odour or other methods the PCPB may approve to provide a signal or warning of its presence. Regulation 11 specifies the conditions under which a pest control product shall be distributed. Regulation 13 specifies the technical requirements for packaging (e.g., packaging material shall be sufficiently durable and manufactured to contain the pest control product safely under practical conditions of storage, display and distribution). Regulation 14 states the general prohibitions (e.g. words stating, implying or inferring that a pest control product is approved, accepted or recommended by the government shall not appear on a package or label in any advertisement respecting a pest control product).

The Pharmacy and Poisons Rules govern transportation of pesticides. Rule 15 states: No person shall consign a poison for transport unless the outside of the package is labelled conspicuously with the name or description of the poison, and a notice indicating that it is to be kept separate from food and empty food containers. Further, the rules provide that no person shall knowingly transport a poison in a vehicle in which food is being transported, unless the food is carried in a part of the vehicle effectively separated from that containing the poison, or is otherwise adequately protected from the risk of contamination.

All the products procured will have the right labels and follow the stipulated labelling rules, failure in to which the procured pesticides will be rejected.

2.3.3 Pest Control Products (Licensing of Premises) Regulations, 1984

contains further provisions addressing the handling of pesticides - Regulation 7 requires that every person operating premises dealing with pesticides must have an adequate knowledge of the chemistry, toxicology, efficacy and general use of the pest control product. Further, the regulations contain provisions identifying pesticide-related activities permissible only to operators holding a valid license. Regulation 3 prescribes the application process for the licensing of premises intended to be used for manufacturing, formulating, packaging, selling or storing pest control products. Regulation 7 requires persons intending to handle, use, distribute, transport or deal in a pest control product under restricted class to apply to the PCPB for a permit as per the prescribed Form D in the schedule. 19

Procurement of the pesticides will ensure the firms delivering the products are from firms that have licensed premises. This will assist CDDCs in case of any fault to ensure the awarded firm had followed the stipulated rules.

2.3.4 Pest Control Products (Disposal) Regulations, 2006

Regulation 2 provides that those disposing pesticides for commercial purposes must be in possession of a license, and the use of any pesticide disposal method must be approved by the PCPB. Further, the **Guidelines for on-farm Disposal of Pesticide Wastes and Containers, PCPB** prescribe best practice when it comes to the disposal of unwanted or unused pesticide concentrates (obsolete stock). Further, **Guidelines for on-farm Disposal of Pesticide Wastes and Containers, PCPB;** prescribe that pesticide containers and packaging materials should never be used to contain water, food or feed stuffs for human or animal use. Additionally, while cleaning containers, the following guidelines must be noted:

- wear protective clothing
- avoid spillages and leaks
- completely empty containers and packages before disposing
- take care to avoid splashing or creating dust
- place cleaned containers in a dry secure compound prior to disposal
- At the container disposal site:
- Containers should be punctured after rinsing to make them unusable, and crushed to reduce bulk
- Combustible packaging materials should be burnt in a licensed incinerator. If not possible, containers should be made unusable, reduced in bulk and buried
- Integrity of containers to be buried should be destroyed
- Aerosols should not be punctured

The CTDs, service providers and lead farmers and beneficiaries will be trained either as TOTs or at group level on safe use of pesticides. Proper disposal of the pesticides and pesticides empty containers will be a key topic in the training. The farmers will also be trained on safe use and application of pesticides and proper use of personal protective equipment. PPEs will be procured and provided to the farmers.

2.4 International Policies and Regulations on Use of Pesticides

2.4.1 Convention on Biological Diversity (1992)

The Convention on Biological Diversity adopts a broad approach to conservation. It requires Parties to the Convention to adopt national strategies, plans and programs for the conservation of biological diversity, and to integrate the conservation and sustainable use of

biological diversity into relevant sectoral and cross-sectoral plans, programs and policies. The proposed programme is expected to conserve biodiversity, especially the rare and endangered species in the project area and its environs. *Pesticides will be used selectively/spot spraying and as the last resort based on scouting and analysis of pest damage findings. Emphasis will be on use of organics and bio pesticides.*

2.4.2 International Plant Protection Convention of FAO (1952)

The IPPC is an international treaty to secure action to prevent the spread and introduction of pests of plants and plant products, and to promote appropriate measures for their control. The Commission on Phytosanitary Measures (CPM), which adopts International Standards for Phytosanitary Measures (ISPMs), governs it.

2.4.3 United Nations Framework Convention on Climate Change (1992)

The convention seeks to regulate levels of greenhouse gases (GHGs) concentration in the atmosphere, to avoid the occurrence of climate change at levels that would harm economic development, or that would impede food production activities. In essence, the locust thrive on vegetative and forage parts of plant therefore depleting carbon sinks. Abating the invasion menace, will not safe vegetation cover but allow for rejuvenation of the damaged forage.

2.4.4 OP 4.01: Environmental Assessment

After the proposed project proposal was developed, the County project implementation team carried out project screening which led to the development of this Integrated Pest Management Plan. Implementation of this PMP will ensure that potential environmental and social hazards and risks associated with use of pesticides are avoided and their impacts minimized. As required by this policy, local beneficiaries and stakeholders were consulted on the potential impacts of pesticide application and corresponding mitigation measures.

2.4.5 World Bank Operational Policy on Pest Management, OP 4.09

The Bank uses various means to assess pest management in the country and support integrated pest management (IPM) and the safe use of agricultural pesticides, economic and sector work, sectorial or project-specific environmental assessments, participatory IPM

assessments, and adjustment or investment projects and components aimed specifically at supporting the adoption and use of IPM. In the Bank-financed agriculture operations, it advocates pest populations' reduction through IPM approaches.

The proposed insecticides to be used for cotton pest control in this program fall under World Health Organization (WHO) class 11 (moderately hazardous) and WHO Class 111(slightly hazardous). World Bank does not finance any pesticides programs, which fall under WHO class 1A and 1B of pesticides. As such, the current project will not use any of the chemical under Class 1A and 1B, thereby complying with Bank Policies. Going forward, *World Bank Group Operational Policy 4.09 will be used as a guide to ensure all the pesticides intended for use are in the WHO classification and are licensed for use in Kenya.*

2.5 Institutional arrangements pest and pesticide management in Kenya

Agriculture is a key sector for Kenya's economic growth, and as such, the government of Kenya has put in place measures to ensure crop protection as well as safeguard health of people involved in agro systems and related actions. Management of pests and pesticides in Kenya is facilitated by many governmental and international organizations that work individually or as teams to ensure that the specific components of good agricultural practices (GAP) are followed, and that there is safe use of pesticides. These include the Ministry of Agriculture, Livestock and Fisheries; Kenya Plant Health Inspectorate Service (KEPHIS); Pest Control Products Board (PCPB); National Environment Management Authority (NEMA); and Agro Chemical Association of Kenya (AAK). Table 1 below gives details of the government agencies involved in pest management and their roles and functions in pests and pesticide management

Table 1: Government agencies involved in pest and pesticide management and their roles

Agency	**Role**	**Specific functions list (relating to pest and pesticide management)**
Ministry of Agriculture		
Pest Control Products Board (PCPB)	• Regulates the importation, exportation, manufacture, distribution, transportation, sale, disposal and use of products used for the control of pests and mitigate potential harmful effects to the environment.	• Enhance compliance of pest control products to set standards and facilitate trade. • Ensure safe, quality and efficacious pest control products are available to users • Enhance responsible use of pest control products and food safety

		• Improve management of pest control products lifecycle
KEPHIS	• Assures the quality of agricultural inputs and produce.	• Certification of the quality of seeds and fertilizers to be used by the cotton farmers • Testing and monitoring the presence of harmful residual agro-chemicals on agricultural produce, soils and water systems • Preventing introduction into the country of harmful foreign weeds, pests and diseases through adherence to strict quarantine regulations and procedures • Inspecting and grading agricultural produce for import and export • Implementing the national policy on the introduction and use of genetically modified plant species, insects and microorganisms
KALRO	• Research in plant health issues related to pesticide	• Efficacy trials of agricultural pesticides for field and stored crops and fertilizers
Ministry of Environment and Mineral Resources		
National Environment Management Authority (NEMA)	• Manage the environment through supervision and coordination of the lead agencies – concerned ministries, government departments and agencies	• Focal point in the implementation of the Stockholm Convention on Persistent organic pollutants (POPs); Chemical management through enforcement of Environmental Impact Assessments and audits where a threat to the environment is anticipated by the use of chemicals listed in the second schedule of the Act
Ministry of Health		
Government Chemists Department	• Provision of laboratory services in the fields of public and environmental health	• Test substances and materials for chemical composition, compliance with legal specifications and their suitability for various uses • Analyses of samples for compliance to public health requirements.
Kenya Medical Research Institute (KEMRI)	• Research in public health issues related to pesticide	• Research on effects of pesticides among formulators/store-men and farm workers • Research portfolio on chemical

		including POPs ;Regular surveillance of POPs pesticide Efficacy trials
Directorate of Occupational Safety and Health Services (DOSHS)	• Ensures safety, health and welfare of workers predisposed to pesticides.	• Identify, evaluate and control biological and chemical factors in the work environment, which may affect the safety and health of employed persons, and the general environment.
Ministry of Industry, Investment and trade		
Kenya Bureau of Standard (KEBS)	• Prepare standards relating to pesticides and their promotion at all levels	• Develop pesticide standards. Testing pesticide residues, and toxic elements in foods Certification of products

The county department of Agriculture and irrigation provide Extension Services to the ward levels. Their extension services are not limited to husbandry practices alone but also encompass high level of pest management. That said it is the national agencies listed in the Table above that are exclusively charged with express mandate of plant pesticides products regulation in Kenya. Various national research institutions are involved in applied research in both crop and animal production. Their focus has mainly been on high yielding varieties of crops and animals as well as development of early maturing and disease resistant varieties. Institutions of particular interest include Kenya Agriculture and Livestock Research Organization (KALRO), Kenya Plant Health Inspectorate Services (KEPHIS) Pest Control Product Board (PCPB). There are also government financial institutions that support farmers such as Agricultural Development Corporation (ADC) and Agricultural Finance Corporation (AFC). However, these do not have a direct role in management of pest and pesticides in the country.

3.0 INTEGRATED PEST MANAGEMENT

3.1 Control Strategies and Management Approaches

The principal aim of strategies designed for cotton pests control is to reduce the number of pests attacking cotton crop to minimal level that will have no effect on cotton production. The strategies will involve environmental manipulation, biological methods, physical methods and the use of pesticides to control the pests in the cotton farms as the last resort if the other methods have not worked to control pests. There are various control strategies and management approaches such as:

3.1.1 Environmental Manipulation

During land preparation and tillage, eggs of cotton boll weevil pests will be destroyed naturally by introducing exposing of the eggs to harsh weather conditions. The larvae can be mechanically damaged during tillage and get destroyed by exposure to harsh weather conditions

3.1.2 Biological Methods

Natural insect pest's predators like lady bird, some wasp species and safari ants that predate on cotton insect pest are beneficial in control and management of cotton pests. Cotton farmers will be informed not to kill these predators.

3.1.3 Physical method of control

Farmers will physically remove Cotton Strainers from cotton crop during scouting of the cotton insect pests in the farms. Physical removal or uprooting of affected plants or removal of affected plant parts is effective in cotton pest control and management. Nut grass weeds are host plants of the chewing and sucking cotton caterpillar that attack cotton. Hand weeding and use of farm hoes to weed control helps to reduce and manage these insect pests hence minimizing the need for chemical control.

3.1.4 Chemical control method

Application of chemicals (pesticides) to cotton pests will be used as the last option when the other methods have all failed. In case the farmer has to use the chemicals then only the

recommended pesticides will be procured and used. The pesticides will be of small quantities that have little impacts to the environment that are reversible.

The trained cotton farmers will spray their crop with right pesticides as advised by the service providers. The farmer will have to use PPEs while spraying; the spray time will be early in the morning or late on the evening. The farmers should not spray against the wind direct to avoid chemical drift.

3.2 Choosing Pesticides for cotton pests.

This IPMP has followed PCPBK, FAO guidelines and WHO pesticides classification on selecting of the pesticides to be used by the cotton farmers. The following considerations will be taken into when choosing the appropriate pesticide for cotton pests' control:

- Efficacy – the more toxic the active ingredient (the poisonous part of the insecticide) is to the different cotton pests, the smaller the amount of active ingredient needed.
- Safety – the product should ideally have low toxicity to mammals (humans, livestock) and other animals such as birds and fish.
- Specificity – ideally the product should be toxic to pests but not to other types of arthropods. If they are toxic to many other types of arthropods they are called broad spectrum compounds, and are not desirable.
- Persistence – the longer the product remains biologically active in the field, the more effective it is because it can kill pests later as they emerge from eggs or arrive in the area. However, there may be more serious effect on other organisms, i.e. greater environmental impact, from a persistent product.
- Route of entry – whether it is a contact or stomach action product will determine its suitability for different targets, e.g. Bollworm and other sucking need a product with contact and stomach action.
- Speed of action – the faster the product works, the less crop damage will be caused
- Shelf life – the longer a product can be stored before use the better. If it is not needed immediately it will still be effective in future years.
- Availability – the availability of the product in market outlets is important in determining the recommendation for the use of the product by cotton CIG farmers.
- Cost – insecticides are one of the most expensive elements in any control campaign so cheaper products will greatly reduce pests control costs.

- Pesticides hazardous levels – the pesticide recommended were WHO class II and III which are moderately hazardous and slightly hazardous pesticides respectively.

3.3 Pesticides to be purchased by CIGs

The pesticides will be purchased by the CDDCs on behalf of the farmers upon a request send to the procurement sub committees of the CDDCs. The CDDCs will float tender for the pesticides to be purchased on behalf of the group of farmers. These pesticides will be delivered to the farmers by the supplier through the CDDCs procurement committees. The procurement committee will hand them over to the farmers.

The farmers will store the pesticides at their premises in safety containers and out of children's reach.

All the beneficiary farmers in this project will be trained on how to spray; i.e. pesticide application. Only the trained farmers will be allowed to apply pesticides on their farms. The sprayer farmers will have to use PPEs while applying the pesticides.

Waste generated will be empty containers and packages of the pesticides which the farmer will triple rinse the containers then puncture to render them unusable for any other purpose and they will be stored by the farmer at safe containers. This waste will later be collected by the grass roots partners (public service providers) from the farmers and make arrangement to collect the waste, transported and handed over to AAK for safe disposal.

The pesticides to be purchased by the cotton CIGs farmers are classified according to WHO classification as in table 2 below. The farmers will not purchase any pesticide that is banned in Kenya for their use. List of banned pesticides is in annex 1. The pesticides and quantities indicated in the table below are to be shared among all the cotton farmers.

Table 2: Pesticides to be purchased by the cotton CIGs

S/no.	Trade name	Registration Number	Active ingredient	WHO Classification	When required (Month)	Quantity of pesticides for all farmers
1.	Prosper	PCPB(CR) 0887	Profenofos 40% + Cypermethrin 4%	WHO class 11 moderately	January 2021	42.8 litres

				hazardous		
2.	Lancer	PCPB(CR)1603	Imidacloprid 100 g/L+ Lambda cyhalothrin 30g/L	WHO class 11 moderately hazardous	January 2021	6.4 litres
3.	Acetastar	PCPB(CR)1367	Acetamiprid 16 g/L+ Bifenthrin 30g/L	WHO class 11 moderately hazardous	January 2021	36.0 litres
4.	Aceprid 20	PCPB (CR) 1218	Acetamiprid 200g/Kg	WHO class 111, slightly hazardous	January 2021	4.0 litres
5.	Tebicon	PCPB(CR) 0938-p*(i)*	Tebuconazole 250g/L	WHO class 11 moderately hazardous	January 2021	2.0 litres
6.	Amino gold (sticker)	PCPB(CR) 1210	Polyalkyleneoxide modified heptamethyltrisiloxane (organosilicone) 800g/L	WHO class 111, slightly hazardous	January 2021	2.0 litres

3.4 Risks Associated with Pesticide Management

The use of agrochemicals will be as the last option in the cotton farming. IPM poses some potential environmental, social, occupational health and other risks associated with the transportation, distribution to points of use, storage, application of the pesticides, as well as the disposal of empty containers. These risks are as depicted in Table 3 below.

Table 3: Risks associated with transportation, distribution to point of use, storage, application and disposal of empty pesticide containers.

Risks at various handling stages	**Potential environmental**	**Potential Social Risk**	**Occupational health risks**	**Others risks**

	Risk			
Transportation	Spillage and leakages, fumes' and fire. Spills if not cleaned or decanting	Long hour in the midst of curfew (covid 19 containment measures) for timely delivery	The operator hazards during spillage and decontamination	Lack of adequate protective gear and absorbent materials
Distribution	Wrong transportation methods/vehicles exposing products to human and environment.	Inequalities emanating from the existing gender and social relations Insecurity & theft leading to loss of pesticides	Lack of knowledge on effect of pesticides by distributors.	Lack of protective gear
Storage	Site location, design, construction requirements for a pesticides store not compliant with set standards with poorly built store, lack of ventilation and floor space leading to containers wrongly stored,	Insecurity prone areas Stress by farmers for fear of accidental poisoning of children.	Spillage, Corrosive containers, loose bags and containers, cake formulations decontamination of store, lack of good store keeping & sanitation practices Food	Use of obsolete pesticides Lack of Shelves,

	spillage, corrosive containers. Prolonged storage of products cause caked formulations. Storage in the living rooms		contamination Risk to children and other family members poisoning	
Application	Pesticides drift during application, spillage and left over pesticide can find their way to non-target areas	Loss of livelihood due to crop damage Low cooperation between the CIG members and the neighbours Sexual exploitation and abuse by the grass root partners during demonstrations and training on pesticides application	Improper labelling leading to wrong usage Cleaning of sprayers and equipment decontamination of stores. Spills on the pesticides applicators Food contamination Safety precautions during handling	Inadequate or improperly used PPEs Contamination of pastures and fodder and food crops through drift during application
Disposal	Improper disposal of empty containers	Fear of potential contamination of water	Effect on food chain because of pollution of environment and	Pesticides and dead pests getting into the food chain

	through burning. Left overs in wrongly disposed containers cause persistence and lasting in soil.	sources from used pesticides container	ground water.	through mishandling

To mitigate the above risks and impacts this PMP will adopt and follow the FAO guidelines on safety and environmental precautions (FAO, 2003). In line with these guidelines, the following will be observed:

3.4.1 Quality Control of Pesticides

a) All the recommended pesticides (Table 3) for cotton pest control will be certified by Pest Control and Product Board and have PCPB number and WHO classification on the product label. Concentration of active ingredient(s) for each product is also indicated on product label for verification purpose. All the pesticides (Annex 1) whose use has been banned in Kenya will be avoided.

3.4.2 Training of Personnel and Farmers on Use of Pesticides

b) Training will be undertaken for all the persons (including the Grassroots partners to be involved in implementation of this IPMP, various logistical support and surveillance on safety and the provisions of this IPMP. This will be facilitated by KCSAP with technical backstopping from County department of agriculture and irrigation. The tailor made training package as provided in the FAO guidelines targeting various groups will be used during these trainings (Table 4).

c) All farmers and extension service providers involved in spraying or demonstration (applicators, etc.) will be provided with approved personal protective equipment. The exact PPEs to be procured as part of this project will be identified in collaboration with the Pest Control Board and the FAO.

3.4.3 Inequalities emanating from the existing gender and social relations.

All cotton farming farmers will be trained on gender mainstreaming. This will enlighten the farmers to know about social inclusion so that no member of the farming family is left out in

the project implementation activity and benefits. Training will help the farmers learn different roles of all their family members and this will help reduce conflicts.

3.4.4 GBV and Sexual exploitation and abuse by the grass root partners during demonstrations and training on pesticides application.

During trainings the grass root partners will sign a safeguarding protocol form that they will not get involved in any form of gender based violence issues and sexual exploitation and abuse. This form will provide code of conduct to participating partners during trainings and demonstration sessions.

Sensitization of both staffs and other partners involved the cotton production project on consequences of non-compliance to gender based violence and sexual exploitation and abuse safeguarding protocol.

Engagement with the community: - including development of confidential community-based complaints mechanisms discrete from the standard GRM where community members will be reporting all the GBV and SEA without fear. Mainstreaming of Protection from Sexual Exploitation and Abuse (PSEA) awareness through raising the information in all community engagement activities; community-level IEC materials; regular community outreach to women and girls about social risks and their PSEA related rights.

3.4.5 Loss of livelihood due to crop damage

All groups implementing the project have a livelihood component that they implement concurrent as they grow cotton. The alternative livelihood is a component that is meant to build resilience to the group members and cope with the day to day living. This component makes the farmers have a source of livelihood.

3.4.6 Insecurity and theft leading to, loss of pesticides

Farmers are supposed to provide safe storage place for the pesticides. All the set a side stores for the pesticides should be rooms with doors that are locked to reduce easy access to the pesticides. In case of theft of pesticides, the affected farmer should take legal measures by reporting the incident to the police of investigation and legal actions.

Table 4: Target trainings for cotton farmers and extension personnel

Target Group	Key Activity	Topics
Pesticide applicator (farmers)	Application	• Application techniques, equipment, maintenance • Equipment calibration • Safety measures, PPE, insecticide poisoning, first aid

		• Environmental precautions • Rapid assessments (efficacy, occupational health, environment)
Farmers & Stockists	Transportation	• Proper handling and transport of pesticides containers • Safety measures, PPE, insecticide poisoning, first aid • Environmental precautions, clean-up of spills
Farmers & Stockist	Storage	• Pesticide storage management • Safety measures, PPE, insecticide poisoning, first aid • Environmental precautions, clean-up of spills
Medical staff	Treatment	• Recognition and treatment of insecticide poisoning

3.5 Ecologically sensitive areas (water sources, pastures, proximity to house hold near apiary areas) should be avoided during spraying.

During the cotton production season, cotton CIG farmers with the guidance of technical assistants (SP, CTDs) will identify all the ecologically sensitive areas in regard to pesticides use. For each sensitive area, pest management options will be evaluated based on the type of organisms at risk and the likely pest targets that may appear in the area. Subsequently, appropriate pest control techniques will be identified for each area. This will include the decision to allow pesticides control or not, the choice of acceptable pesticides, periods when treatments are or are not allowed, appropriate control methods, etc. It is important that all cotton CIG farmers are involved in this assessment, such as biological pest control, (inland) fisheries and bee-keeping etc. The farmer can map out the most sensitive areas like the inland fisheries, pasture/fodder areas, proximity to household areas and apiary. The management measures are as illustrated in Table 5 below.

Table 5: Ecologically and agronomically sensitive areas and their management measures

S/No	Ecologically and agronomically sensitive	Management measures

	areas	
1.	Important (inland) fisheries areas; mangrove forests	Only insecticides with very low hazard to fish and aquatic invertebrates are to be used
2.	Important fruit cotton intercrop areas; beekeeping areas	No insecticide applications during flowering of fruit trees; only insecticides with very low hazard to bees; set up information system to warn bee-keepers of upcoming treatments
3.	Areas with important biological pest	Only insecticides with very low hazard to natural enemies of pests
4.	Areas with animal fodder/pasture	Only insecticides that do not pose problems with export maximum residue limits

3.6 Management of pesticides by the cotton farmer

3.6.1 Transportation, distribution and Storage of pesticides

a) Individual farmers transporting pesticides to their farms will be sensitized on accident prevention and on dealing with emergencies such as spillage or fire during transportation.

b) The KCSAP through the service provider will ensure that pesticides are not transported with any foodstuffs and that they are covered and well labeled at all times during transport and storage. Labeling will follow standard FAO procedures/ guidelines.

c) The farmers will provide safe storage for the pesticides distributed to them. The farmers will store their pesticides where they store their farm inputs. These rooms have to be locked so as to deny access to children, Farmers will be sensitized on the proper storage, as informing them that pesticides are not supposed to be exposed to direct sunlight/rains, the room should be well ventilated and the store to be kept dry. The farmers will adhere to the appropriate store management by applying the rule of the thumb (i.e. first in first out- (FIFO) and providing the right storage materials to curtail or minimize storage accidents, leakages and spillages.

3.6.2 Use/application of pesticides

During use/application of pesticides the handlers will be trained on the types of pesticides, their mode of application and application rate. The training will also include other aspects such as; the best weather conditions favourable for pesticides application to enhance efficacy, and calibration of the spray equipment to avoid over dose or under dose of the pesticides that may result to pest resistance. Information and knowledge on first Aid in case of accidental poisoning by the pesticide will also be disseminated and appropriate use of PPEs during pesticides application.

3.6.2.1 Implementing Groups

The integrated pest management plan will be implemented by the cotton Common Interest Groups namely: - United Generation S.H.G at Hindi ward, Msenangu S.H.G at Mkunumbi ward, Uzima Mafanikio S.H.G at Mkunumbi ward and Saba Saba Youth Mbunge at Bahari ward. All these cotton CIGs are in Lamu West Sub County, Lamu County

3.6.3. Waste management of pesticide containers.

The containers will be triple rinsed and made unusable by puncturing the containers, the farmers will store the waste at safe place; and then the service provider will collect the waste containers and transport to AAK for incineration. The project will bear the expense of collection and transporting the waste to the nearest AAK site for incineration

The farmers will be trained on safe disposal of waste and adhere to safe waste protocols on the disposal of pesticide containers.

3.7 Public awareness and communication

As the farmers will use pesticide the public will be kept informed about possible environmental, social and health effects of the pesticides, before, during and after the application of pesticides through public barazas and any other informal gathering. This will ensure that precautionary measures are taken whenever needed so as to reduce any misunderstandings that may exist about the risks that can be caused by the use of pesticides in cotton crop farming. This information will shall be communicated to the public/ community members by the CIGs members, local agricultural (extension) officers and local leaders. The content of the information to be shared to the public will be the risks involved in the pesticides application and its management.

The service provider will sensitize both the communities and government agencies on spraying and ways to keep themselves, their animals and crops safe. There will be special emphasis on “do no harm” principle. The Service provider will ensure the grass root partners and any other stakeholders like cotton buyers do not engage in any sexual abuse of the

farmers during buying of cotton as most of the women will be involved in the market to sell the cotton. Family members of the cotton farmers should be encouraged to share the proceeds of the cotton as a family. The entire family member who participated in the cotton farming activity should participate equally in enjoying the proceeds of the cotton after selling.

3.8 Grievance Redress Mechanism

KCSAP has a robust grievance handling mechanism, which is to be applied for all project activities. A sensitization will be done to the target beneficiary community. The beneficiaries will be informed of all the expected impacts from the use of the pesticides and the safety measures to be observed by the community during handling.

The community members will register their compliant at the group level where we have the Social Accountability and Integrity Committee (SAIC). The community will be able to maintain a complaint record database to enable complaint tracking, review and grievance redress.

KCSAP has established process for handling complaint/grievance from the group level to national level. The grievance will be received through an SMS, or written note dropped at the group complaint/suggestion box or at the community driven development committee office (CDDCs) or at the Sub County Agriculture offices or at the County Agriculture office.

3.9 Information management

All cotton groups that are funded by KCSAP disclose information to the community about the project they are undertaking. The information is displayed on a notice board informing the community the activities being implemented. The groups will show that they are farming cotton and indicate pest management method in use. In case of pesticide use details of active ingredient, spray date and time, precautions and safe harvest date.

The CIGs will have sign board that will have the contact, postal address and also telephone/mobile number of the one group members (contact/lead farmer) who can be contacted in case of any clarification when needed about the farming practices and the implementation of the IPMP.

The community will be informed through public barazas, sensitization meetings, CIG trainings and Farmer Field/business schools that the active ingredients the funded CIG use as part of the pest management practices.

3.10 Disclosure of the IPMP

Once approved by the World Bank the cotton IPMP will be shared with County information officer for uploading on County website, NPCU to upload on KCSAP website and World Bank info shop

3.11 Monitoring of pesticides and their use:

The project has a committee known as County Environmental Social Safeguard committee which is composed of several technical department officers who will monitor environmental and social safeguards related matters. The committee meet quarterly and have meetings but may also meet any other time on need basis. They also receive any escalated environmental and social complain from the community regarding the activities related to the project. All issues arising from pesticides use will be discussed and appropriate solution will be given. The committee will carry out a field visit to assess the use of the pesticides.

The County Project Coordination Unit (CPCU) will carry out quarterly supervisions. During the supervisions they will monitor the use of the pesticides.

The service provider and the County Environmental and Social Safeguard Compliance Officer who is CPCU member will monitor the implementation of the PMP. The grass root partners will monitor the field application of the pesticides. This is to ensure protection of human health and the environment.

3.12 Monitoring of the IPMP implementation

Frequent monitoring of the environment where cotton planting is being done will be conducted. Water samples will be taken for chemical analysis at government chemist to test for chemical contamination.

3.12.1 Monitoring approaches:

The following approaches will be employed to attain thorough monitoring, environmental safety and effectiveness:

3.12.2 Monitoring of chemical presence in the environment

This will be done to establish presence of chemical in water sources for domestic use. Water samples from water sources will be collected for analysis to determine whether there is chemical contamination of water sources. This exposure could occur during pesticides application and point of pesticide mixing.

3.12.3 Spray monitoring

Use of PPEs by pesticides applicators will be monitored by the KCSAP CPCU members during supervisions and technical extension staff (grass root partners) involved in cotton CIGs.

3.12.4 Efficacy assessment

Efficacy assessments will be made to verify whether the IPM methods and the control techniques are effective. Efficacy will be checked regularly, on methods which one has experience. Monitor whether a pesticide product it is supposed to be used as per specification and recommendation on pesticides label.

Reporting

A detailed report of the results of the monitoring exercise will be done. The report will provide practical recommendations for improvements on best practices during cotton pests' control and minimizing on environmental and health risks.

4.0 BUDGET FOR IMPLEMENTING THE IPM

The total estimated cost for implementation of this plan is Ksh 2.838,020. The planned activities forms an important part of the mitigation measures (depicted in table 6) as training of the CIG Members, supervision by field officers, and some will be used for monitoring by CTDS, CPCU, KALRO, beneficiaries among other stakeholders, collection of water samples for analysis, waste management and stakeholder consultative forums is estimated to take Ksh 927,020 while equipment and various farm inputs cost is estimated at Ksh 1,911,000.

Table 6: Activity Budget

Activity	**Item description**	**Quantity /No**	**Total Estimated costs (Ksh)**
Pesticides,	Prosper Lancer Acetaster, Aceprid, Tebicon,- Amino gold .	Table 2	645,000
Equipment & Protective gears; Covid -19 protective items	Sprayers & protective clothing, masks and sanitizers	Various	722,000
Other inputs and fertilizers	Foliar and granules	Various	544,000
Waste management(collection &disposal of containers)	Collection, transportation & disposal	Twice	134,000
Capacity building of TOTs (lead farmers, Service providers & CTDs) and CIG trainings	Persons training days	1200	215,150
Toxicological tests (sample collection, testing and analysis)	Bi-annually	2	204,000
Follow ups, supervision and backstopping support by CTDs	Quarterly	4	209,470
Stakeholder engagement and consultative	umber of meetings	3	164,400

forums at community level and reporting			
		Total	2,838,020

REFERENCE

Government of Kenya (2016a); Kenya Climate Smart Agriculture Project (KCSAP) Environmental and Social Management Frameworks (ESMF)

Government of Kenya (2019); Registered Pest Control Products for use in Kenya, publication by Pest Control Products Board (PCPB)

World Bank (2017); Kenya Climate Smart Agriculture Project (KCSAP) Project Appraisal Document (PAD) January 13, 2017

World Health Organization (2005); The WHO recommended classification of pesticides by hazard and guidelines to classification: 2004.

Food and Agriculture organization of the United Nations World Health Organization Rome: 2019: Management of Pesticides in Agriculture and Public Health; An overview of FAO and WHO guidelines and other resources.

ANNEXES

ANNEX 1 (LIST OF BANNED PRODUCTS BANNED PESTICIDES IN KENYA)

List of Banned Products Banned Pesticides In Kenya		
2,4,5 T (2,4,5 – Trichloro-phenoxybutyric acid)	Herbicide	1986
Chlordane	Insecticide	1986
Chlordimeform	Insecticide	1986
DDT (Dichlorodiphenyl Trichloroethane)	Agriculture	1986
Dibromochloropropane	Soil Fumigant	1986
Endrin	Insecticide	1986
Ethylene dibromide	Soil Fumigant	1986
Heptachlor	Insecticide	1986
Toxaphene (Camphechlor)	Insecticide	1986
5 Isomers of Hexachlorocyclo-hexane (HCH)	Fungicide	1986
Ethyl Parathion	Insecticide All formulations banned except for capsule suspensions	1988
Methyl Parathion	Insecticide All formulations banned except for capsule suspensions	1988
Captafol	Fungicide	1988
Aldrin	Insecticide	1989

Benomyl, Carbofuran, Thiram combinations	Dustable powder formulations containing a combination of Benomyl above 7%, Carbofuran above 10% and Thiram above 15%	2004

ANNEX II: SCHEDULE OF ACTIVITY (GHANTT CHART)

ACTIVITY	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
Land preparation							
Demonstration on planting							
Planting cotton							
Fertilizer/manure application during planting stage							
Training on fertilizers application							
Application of foliar fertilizers for cotton							
Training on pesticides use							
Spraying after cotton							
Weeding of the crop							
Harvesting and marketing of cotton							
Slashing of crop residues after harvesting							