

Nature-based Green Innovative Solution to Food Security in the Horn of Africa.

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The Desert Locust Control Organization for Eastern Africa (DLCO-EA) is a Regional pest and vector management Organization, established by an International Convention signed in Addis Ababa, Ethiopia in 1962 and registered under United Nations (UN). This followed the recommendation in October, 1961 by the 3rd Session of the FAO Eastern Africa Desert Locust Control Sub-Committee which had met in Addis Ababa, Ethiopia. The member countries include; Djibouti, Eritrea, Ethiopia, Kenya, Somalia, South Sudan, Sudan Tanzania and Uganda. The establishment of the DLCO-EA was to contribute to the efforts being made by the Member Countries towards the promotion of peaceful coexistence in conducting cross border migratory pest control operations. The DLCO-EA's Treaty takes a holistic approach in the quest for which is in line with UN Sustainable Development Goals (SDG 1 &SDG 2) to enhancement food security, poverty and zero hunger in the region, having regard to address the outbreaks of migratory pests and vector.

DLCO-EA Mission & Mission

Vision: To be a center of excellence in migratory pest and vector control and management.

Mission: To sustainably manage mandated migratory pests and vectors in an environmentally safe approach

Background

Desert Locust (*Schistocerca gregaria*) is considered the most devastating and dangerous migratory pest in the world. A typical swarm can be made of 150 billion locust/km² and one km² swarm has the capacity to consume in equivalent in crops that could feed 35,000 people in year. Desert Locusts (DL) can also move very fast covering 100 to 150 km per day, enabling their quick spread, destruction and complicating control measures and seriously damaging agricultural productivity and hampering progress on Sustainable Development Goal (SDG) and Gross Domestic Product (GDP) growth. Many African countries, particularly DLCO-EA frontline member countries, notably, Eritrea, Ethiopia, Somalia and Sudan, require bold policy and technical actions to address this challenge.

The chemical pesticides used widely in the world to control DL are being strongly opposed and discouraged by scientists, public health experts and government officials. The main reason is because those chemical pesticide give rise to social costs; high toxicity on food chains, water and land ecosystems and environmental health. This situation has created huge demand for alternative to chemical pesticides.

To address this challenge, DLCO-EA an intergovernmental body created, governed and mandated by the nine (9) eastern Africa countries to respond directly to threats on food security and emergencies caused by DL outbreaks in those countries, has produced a series of new green inventions based on natural product that are good alternative to those chemical pesticides. The

inventions have shown some potential to improve DLCO-EA delivery on its mandate, notably, the control of DL, *Quelea* birds, African armyworm and Tsetse flies that DLCO-EA achieve using its own aircrafts allowing both the aerial spraying of pesticides and surveys, monitoring weather and ecological conditions and locust situations that guide intervention and control operations.

Initial reflection indicates that these new inventions are efficient as an alternative to chemicals, in ridding off locusts, while leaving non-observable environmental impacts. DLCO-EA intend to secure intellectual property protection (patents) for the inventions, and manufacture and use them on pilot scale in selected member countries. This will also provide the required training to improve the technical capacities to proceed with mass production.

Increased safety and availability of the green inventions in DLCO-EA member countries and across the Africa Continental Free Trade Area (AfCFTA) will benefit wider geographical areas and larger populations that share common threats from migrant pests and vectors, reduce environmental stress of chemical pesticides on land and water ecosystem and biodiversity.

Consultations between Technology, Climate Change and Natural Resources Management Division (TCND), ECA and DLCO-EA indicate that DLCO-EA green invention has a potential to help and improve its support to the member countries. The invention can also support regional efforts to mitigate challenging impacts of DL and other pests on agricultural productivity, food security, deforestation in Sahel, and other regions of Africa and beyond. Support to this invention will allow TCND/ECA to execute some of its mandate such as those outlined through the Ministerial Declarations made through the High-Level Political Forum on Sustainable Development (HLPF) on SDGs of 2018, 2019 and 2020 held under 20 auspices of Economic, Social & Cultural Council (ECOSOCC), AU.

The work aligns with key recommendations and declarations made through the Africa Regional Forum on Sustainable Development (ARFSD) in 2021 on the issues relating to food security, sustainable consumption and production (mainly restriction of chemical pollutants), etc. The invention will contribute to national and regional effort to mitigate food security (SDGs), conserve life on land, mainly forest (SDG 15), and accelerate progress on sustainable consumption (SDG 12) by restricting the use of the chemical pollutants including chemical insecticides are recommended by the UN, and AU widely endorsed by African Head of States using more greener innovations that reduce various risks cause by the outbreak of Desert Locust.

In collaboration with UNECA, DLCO-EA implemented this Project in selected countries of Ethiopia, Somalia, Eritrea and Sudan to respond to threats caused by DL on the farmer communities and their livelihoods. The main output was patenting of the green invention, development of DL forecasting models and social economic impact of DL invasions, given that the GDP of most of the member countries heavily depends on agriculture and explore mass production of the green invention. DLCO-EA intends to upscale the outputs of the project with partners including;

- 1) Scientists that are expected to monitor the use of the green inventions and improved forecasting models in the respective member countries.

- 2) UNECA that will provide technical advice on pilot tests of the green inventions and subsequent due-diligent for co-manufacturing and marketing of the green invention with lead enterprises.
- 3) Private Sector Development and Finance Division that is expected to provide guidance on large-scale applications of the green inventions and improved forecasting model to support food security within the AfCFTA.
- 4) UNEP, FAO, and WHO that are expected to provide additional guidance environmental safety of the green inventions.
- 5) AUC that is expected to facilitate availability of the green inventions across the AfCFTA.

This project and its outcomes relate to the following legislative mandates included in the 2022 PPPI:

- i) 884 (XLIV) on climate change and sustainable development in Africa. Associations between the outbreaks of migratory pests (mainly desert locusts) and global warming are being observed in across Eastern Africa, and some countries from the Sahel region. Developing robust forecasting models for such outbreaks in the increasingly changing climate confounded by other parameters including changing ecosystems is crucial in allowing local governments including DLCO-EA members to devise effective risks management plans.
- ii) 877 (XLIII) on realizing a food-secure Africa. Chemical pesticides that currently are widely used to control the outbreak of locusts are recognized by various UN Conventions/Protocols, Agenda 2063 and Agenda 2030 as being seriously harmful to land and water biodiversity and ecosystems, agricultural products, and animal health, thus needing urgent remedies, mainly nature-based solutions. The green inventions being developed by DLCO-EA constitutes an important step towards those remedies.

Policy relevance

Regional pest forecasting and warnings models that benefit the DLCO-EA member countries, which are under potential threat of DL invasion for better planning control operations of outbreaks, thus reducing risk of DL and other migratory pests on forest, agriculture productivity and food nutrition and food insecurity was created.

Development and dynamics of DL strongly associated with environmental conditions and climate change scenarios, the DL invasion frequencies in the future are likely to increase by increasing the suitable areas for breeding. This was critically evident during the 2020 DL invasion in east Africa where all countries demonstrated an increase in the number of places invaded.

Additionally frequent occurrence of DL locust in the region will likely cause shift and transformations in the dynamics of the country's population (massive urbanization through rural to urban migration), gender imbalance, agri-food prices, food distribution and food security.

The development of monthly prediction of DL scalable model that can be used or projected anywhere in the world as the basic ecological principle of organisms do not necessary change. This is extremely useful worldwide and can be lined to other integrated pest management (IPM) applications.

The communities that have accurate breeding detection tools and use of a combination of chemical pesticides and biopesticides as integrated pest management strategy was the best bet to mitigate DL future impacts and environmental pollution. It was shown that DL have a significant impact on decrease of farming areas and food production while urbanization rate has increase, all lead to increase of food demand and price with less food supply resulting in high food insecurity across the affected countries.

Previous research has shown that DL outbreaks can have significant socioeconomic impacts, including food shortage, crop losses, and economic losses for affected communities (FAO,2020). The World Bank has estimated that DL have caused up to \$8.5 billion in economic loss in Africa alone since 2019 (World Bank ,2020).

The impact of DL invasion in eastern Africa in line with socioeconomic factors, in term of countries' rate of urbanization changes, farming expansion and food production and how they lead to food unavailability (demand, supply and prices) and food and nutrition insecurity in those countries. In addition to sub-Saharan Africa, particularly eastern Africa, the DL contributing to slowing down of the expansion of farming areas and food production and supply with an increase in food demand and food and nutrition insecurity across the eastern Africa countries under current climate conditions with an anticipated potential increase in the future.

The scenario simulation and policy options analysis revealed that the scenario where the communities have accurate prediction models and tools that detect when and where the DL will breed for rapid control intervention on at early stages and the option of chemical pesticides and biopesticide combination as an IPM strategy was best case of mitigation of DL socioeconomic impacts and reducing the risk of environmental pollution.