DRONES FOR DESERT LOCUST CONTROL IN EAST AFRICA

Locations Kenya

Dates 01/09/2020 - 25/03/2022

Summary

The desert locust, *Schistocerca gregaria* (Forskal), is arguably the most destructive agricultural pest, globally. During 2019 and 2020, the changing weather created conditions that are favoured by the desert locust for rapid reproduction and migration and led to the pest spreading through the Horn of Africa, East Africa, Arabian Peninsula, South West Asia and West Africa. It is estimated that over 25 million people in Ethiopia, Kenya, Somalia, South Sudan, Uganda and Tanzania will face acute food insecurity in 2020 due to the desert locust plague. This initiative tested the use of drones as a new technology to complement traditional desert locust management measures, including the development of Standard Operating Procedures for optimal use of the technology. The project was trialled in Kenya with the potential for scaling to other affected African countries.

The problem

The causes of sporadic locusts' swarms of current global proportions are not fully understood, but it is widely agreed to be linked to favourable climate conditions (high rainfall and warm temperatures) and limited ability to implement preventive measures in far-to-reach breeding areas. These conditions are likely to become more regular given the backdrop of climate change. Left unchecked, the numbers of this crop-devouring insect can grow exponentially to hundreds of millions of individual desert locusts.

The locust crisis will continue to threaten food security across Eastern Africa unless mitigation measures are in place to track and combat them. New technologies, such as drones, can support current and future ground and aerial management efforts.

Drones can complement current spraying means, as they are very targeted and can treat infestations that might otherwise be difficult to reach with vehicle-mounted or hand spraying methods. Drones can target small swarms that may not be feasible to control by aircraft, populations that escape the aerial sprays and roosting locusts in inhabited areas or agricultural lands.

Drone technology is versatile. Its ability to be adapted to carry chemical payloads complete with specially fitted Ultra Low Volume spraying technology and spectral cameras allows for both targeted spraying in hard to reach areas as well as mapping to determine crop loss.

What we are doing

CABI and Astral-Aerial partnered to pilot the use of drones to control the desert locust. The technology works by equipping Unmanned Aerial Vehicles (UAVs), or drones, with specially designed and calibrated spraying equipment that enables mapping and precision spraying.

This pilot evaluated the benefits and efficiency of using drone technology as a complementary spraying method to manage locusts, including its effect on other beneficial insects and the environment. In the future, drone technology could be adapted for deployment of a biopesticide product based on the fungus *Metarhizium acridum* (GreenMuscle™ – a biological product CABI worked on and now licensed through Elephant Vert) against hopper bands (a cohesive mass of young desert locusts) for sustainable control of future generations.

Drones can also be used to conduct post-spraying mapping and ground sampling to determine the extent of desert locust eradication from spraying operations. Critical data on locust roosting behaviour on different crops and agro-ecologies can be used to guide high-precision targeting of drone spray activities.

Results so far

The initiative combined the right match of technology, technical and scientific expertise from CABI, operational processes and procedures as well as regulatory compliance to validate the use of drone technology. Findings from the project determined if drones can be used as a complementary tool to sustainably manage locusts when combined with Standard Operating Procedures and operating parameters for the safe and effective use of the technology, including adaptation to deploy more environmentally friendly biopesticide options.

A study detailing the outcomes of this project highlighted that while current methods of control rely on conventional chemical insecticides during invasion, some environmentally friendly biopesticides based on *Metarhizium acridum* and insect growth regulators can also be deployed in preventative control operations. It also found that spraying a control agent from a specific height is more effective than other heights tested. This study demonstrated that spraying desert locusts using a drone at any height below 10 metres may lead to over-deposition of the biopesticide, while heights above 10 metres may lead to under-application, which may limit exposure of the locusts to *Metarhizium* spores or pesticide molecules.

Furthermore, targeting the most susceptible early stages is also cost-effective in terms of the density of bands that will be controlled at once. Further research could explore the gap in the effects of environmental parameters on flight application efficiency.

Listen to the podcast:

Donors	Foreign Commonweath Development Office (FCDO) through the Frontier Technology Livestreaming
Partners	Astral-Aerial, County Governments in project areas, Ministry of Agriculture Livestock Fisheries and Cooperatives (MALFC)
CABI Project Manager	Ivan Rwomushana




https://www.cabi.org/what-we-do/cabi-projects/