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Farmers' and academia's views"

Towards early responds to desert locust swarming in eastern Africa

Tobias Landmann[1], Benard Malenge[2], Elfatih Abdel-Rahman[3], Igor Klein[4], Henri Tonnang[5], Sheila Wafula [6], Emily Kimathi[7]

[1]*Icipe, Tobias landmann, Kenya*
[2]*ICIPE, Data management, modelling, and geo-information, Kenya*
[3]*International centre of insect physiology and ecology, Data management, modelling, and geo-information,*
[4]*German Aerospace Center (DLR), Germany*
[5]*International Centre of Insect Physiology and Ecology (icipe), Kenya*
[6]*International Centre of Insect Physiology and Ecology, Data Management, Modelling, and Geo-Information, Kenya*
[7]*International Centre of Insect Physiology and Ecology, Data Management, Modelling, and Geo-Information, Kenya*

Abstract

On top of food security constraints by the Corona pandemic and climate stressors, desert locusts (*Schistocerca gregaria*) pose an additional livelihoods threat to communities in eastern Africa.

The Food and Agricultural Organisation (FAO) of the UN has developed desert locust modelling routines that are able to identify most suitable regions for swarm attacks and movement of bands (and thus can help to scale out interventions). However, controlling these insects at this stage of their life cycle (adult) is extremely difficult, hence a comprehensive early warning alert system is needed to facilitate early response at a juvenile stage. In this regard, the German Aerospace Center (DLR) in cooperation with the International Centre of Insect Physiology and Ecology (icipe) (Kenya), have teamed up to develop a geospatial monitoring routine that can predict timing of locust hatching in eastern Africa. The monitoring routine is based on spatially explicit geospatial data, particularly from satellite observations, while locally assembled field survey data on hatching of bands (from Sudan and Kenya) are used as reference data. Specifically, a fuzzy logic model was implemented that uses data ranges from newly available climate data (temperature and rainfall at 25 km grid cell resolution from the NASA Power platform; https://power.larc.nasa.gov/) and processed satellite observations (on vegetation density). All data sets were processed for the same historical period (2016 to current). The model was initially developed (trained) for a region in Red Sea state in Sudan. Subsequently, the model was validated and applied to northern Kenya. Given the time range between hatching and formation of hopper bands, we estimated the timing of hatching for several periods within the rainy seasons (October to March), for both countries, respectively. A spatially explicit model output showing hatching probability was produced for Kenya, showing hatching "hot spot" areas, and associated timing of hatching, in Turkana and Marsabit counties, respectively. This is a first step in operationalizing an early response to locust infestations at juvenile stage of the pest development for control strategies to be easily applied.

Keywords: Africa, desert locust, early warning , earth observation, food security, modelling

Contact Address: Tobias Landmann, Icipe, Tobias landmann, Icipe str.1, 00100 Nairobi, Kenya, e-mail: tlandmann@icipe.org