BIOSPACE: USING SPACE-ENABLED REMOTE SENSING FOR LONG TERM SUSTAINABLE GROWTH OF BIOPESTICIDE USE

Locations China, Laos

Dates 13/02/2020 - 31/03/2022

Summary

Pests and diseases cause significant losses of crops around the world and are a significant threat to food security. In China and Laos, locusts affect over two million hectares of agricultural land and recently, the fall armyworm is becoming prevalent in China and Southeast Asia, already affecting 35,000 hectares of maize in Laos. Due to a lack of detailed information on where risks to crops are greatest and farmers using inappropriate and ineffective control measures, managing the damage from pests can be problematic. There is also a resistance to chemical pesticides from the farmers and overuse of them cause both environmental and human health harm. In this project, we will use Earth Observation (EO) and meteorological data to provide information to farmers and agricultural authorities to help manage pest risk more sustainably. Inevitably, this will help to reduce hunger and promote sustainable production and consumption of crops by promoting biopesticides.

The problem

In China, the migratory locust affects over two million hectares of agricultural land, while in Laos the yellow spined bamboo locust (YSBL) is widespread across the nine districts of Northern Laos and damaged over 5,000 hectares of crops in 2019.

A new invasive pest, the fall armyworm, is becoming prevalent in Southeast Asia and China. It has been found in 22 provinces in China and affected 35,000

hectares of maize in Laos. Experience from Africa shows it can cause almost total crop losses.

Managing the damage from pests can be difficult. There is often a lack of detailed information on where risks to crops are greatest, inappropriate, or ineffective control measures are used, and there is a resistance to chemical pesticides. Furthermore, the overuse of chemical pesticides causes environmental damage in the form of biodiversity loss through chemical residues being left in the environment and on food.

To help tackle the problem, this project will act as an early warning system that will identify the location of high pest populations whilst giving information on how to use biopesticides effectively to control locusts in an environmentally-friendly way.

What we are doing

In this project, BioSpace, we built upon previous work on locust forecasting and promoted the use of biopesticides by validating the models in the different climatic region of Hainan, Southern China.

We have shown that EO data can be used in Shangdong, Eastern China and wanted to confirm the effects a different climatic region has on the models produced.

Key activities of the project included:

1. EO data gathered for the Hainan region which was then ground-truthed to validate the models in a different climatic region
2. Our models were adapted to other locust species while simultaneously giving expert advice in helping Laos to control the YSBL with environmentally-friendly biopesticides
3. Disseminated activities and results of the project to Laos and the end-users in China through a workshop and training of trainer activities
4. Worked closely with NATESC to implement Beta trials of the BioSuccess app (developed as part of a European Centre for Medium-Range Weather Forecasts (ECMWF) funded project) which aids decision-making on when to apply biopesticides.

Results so far

The project used EO and meteorological data to provide information to farmers and agricultural authorities to help them sustainably manage pest risks.

Project outputs included the collection of distribution data for the YSB and used in a model to predict areas susceptible to invasion allowing early warning for decision makers. Beta testing of the BioSuccess App was carried out during a two-day workshop where valuable feedback on improvements was gained to make improvements.

A biopesticide performance model was calibrated by collecting environmental data which was used to further validate the EO data in a different climatic zone of Hainan in July and November 2021. Model and risk maps were also produced for fall armyworm, looking at data from the last 20 years to assess the spreadof the pest. A a socio-economic survey was also produced.

Donors

Science Technology and Facilities Council

Partners

Lao People’s Democratic Republic, Ministry of Agriculture and Forestry, Aerospace Information Research Institute Chinese Academy of Sciences, National Agro-Tech Extension and Service Center (NATESC), Assimila

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