

INTEGRATING ADVANCED EARTH OBSERVATION AND ENVIRONMENTAL INFORMATION FOR SUSTAINABLE PEST AND DISEASE MANAGEMENT

Locations China

Dates

01/06/2016 - 31/05/2019

Summary

Forecasting and monitoring insect pests and disease outbreaks is vital for protecting China's economically important agricultural sector. By combining information gathered from Earth Observation and environmental data, CABI and partners will design innovative data products and communications tools to help decision makers sustainably manage wheat yellow rust and migratory locusts. A biopesticide development model will also be developed to help end-users decide when to use a biopesticide over a chemical pesticide.

The problem

The Chinese Ministry of Agriculture has set targets to achieve zero-growth in chemical pesticide use by 2020. Approaches to maintain pest and disease control whilst reducing chemical inputs need to be researched, and must include more targeted applications of pesticides or switching to products such as biopesticides which have a low ecological impact.

Predictive modelling and monitoring data gathered from Earth Observation (EO) are valuable sources of information to advise farmers on the rational use of pesticides; when there is enough time to apply a biopesticide instead of chemical pesticides.

In China, guidance and advice on methods of pest and disease control is provided by the National Agro-Tech Extension and Service Center (NATESC), which provides agricultural extension services to farmers. NATESC has worked closely with CABI to improve how pest and disease management advice is sourced and communicated to farmers using models derived from multi-source EO and environmental information.

What we are doing

This project is based on a previous successful CABI project (2015 – 2016) which combined EO and agricultural expertise from both the UK and China, to develop a prototype system providing information to NATESC locust control extension workers.

Through multi-disciplinary teams this project aims to give timely advice on the possible location and timing of locust outbreaks and stripe rust in China. The project uses data from satellites and other environmental information to help extension workers make informed decisions about pest control activities. Models will be validated in the laboratory and in the field to give a measure of certainty of predictions.

Crop risk and loss estimation from locust swarms will be investigated using cutting edge EO techniques and monitoring. The biodiversity of insect species in crops will be assessed using Vertical Looking Radar, a technology capable of identifying the size and species of flying insects.

In addition to building monitoring and forecasting systems, CABI will investigate how this information should be best communicated to ensure the benefits of the technologies are felt by farmers and other stakeholders. The project consortium will work closely with NATESC in China to ensure the system is built in a way that is compatible with current dissemination approaches.

Results so far

The results and outputs of the project have been significant and varied. Of the 55 crop pest and disease monitoring and forecasting reports released, 30 alone were adopted by the Ministry of Agriculture and Rural Affairs, and 10 by CropWatch (China's leading crop monitoring system), among other government agencies. Through NATESC, the project has trained 2,800 technical staff, extension officers and farmers on how to understand and use the reports.

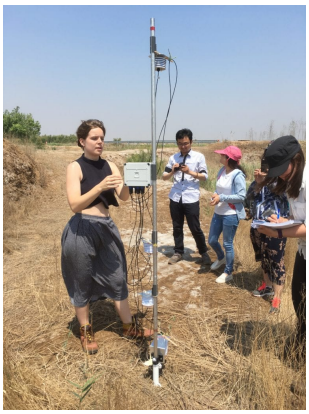
Forecast maps and reports produced for yellow wheat rust have been submitted to the Chinese Government on 42 occasions to advise farmers of severe yellow wheat rust outbreaks and whether to apply chemical fungicides to their crops.

To guide the spraying of pesticide by drones, 27 thematic maps of wheat rust spread have been created and used by the National Aviation Plant Protection Science Technology Innovation Alliance, and the commercial company Anyang Quanfeng Aviation Plant Protection Technology Co., Ltd.

After developing a locust development model and biopesticide efficiency model, organizations such as NATESC are using them in conjunction to decide whether less harmful biopesticides can be used.

On a scientific level, one book and 42 scientific papers have been published, along with 8 patents and 5 soft copyrights registered as part of the project.

Donors	NSFC, STFC Newton Fund
Partners	National Agro-Tech Extension and Service Center (NATESC), Zhejiang University (ZJU), Institute of Plant Protection. Chinese Academy of Agricultural Sciences (IPP-CAAS), Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences (RADI, CAS), King's College London, Rothamstead Research, Assimila Ltd
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