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## Case Study

# Detection of False Codling Moths in Chilli Plants

Global Alliance Africa collaborates with Flamingo Horticulture International, local farmers and UK-based Petiole to address pest challenge threatening Kenya's exports

[iuk.ktn-uk.org/programme/africa](http://iuk.ktn-uk.org/programme/africa)



# The Context



Agriculture plays a vital role in the Kenyan economy and is a significant contributor for job security and economic growth. The sector accounts for **27% of Gross Domestic Product (GDP)** and employs **more than 40% of the total population** (and 70% of Kenya's rural people).<sup>1</sup>

Given the threat of global food shortages and the surge in agricultural input prices in recent years, maintaining reliable supply chains and controlling the damage caused to harvests (and, subsequently, to associated communities) by insect pests is a fundamental aspect of securing food security and livelihoods for farmers in Kenya.

Innovate UK KTN's Global Alliance Africa project<sup>2</sup> recently partnered with Flamingo Horticulture International in finding **innovative solutions to detect and screen False Codling Moth (FCM) in fresh chillies** – an economically damaging pest that impacts over 70 host plants in Kenya and across Sub-Saharan Africa.



FCM is a pest of economic significance that places the continued export of high value crops from Kenya to Europe at risk. For a sector which is worth nearly \$2.3b to the Kenyan economy, FCM infestation is estimated to cost over \$40m annually to control on roses, chillies, aubergines and avocados, while the monetary losses from potential interceptions and rejections by port health authorities is about \$55m<sup>3</sup>. Whole shipments are destroyed if any trace of the moth is discovered, and farmers can lose their export licences.

In 2020, regulations were tightened further following changes to EU regulations leading to increased levels of interceptions of capsicum shipments by the Kenya Plant Health Inspectorate Service (KEPHIS), the agency responsible for pest regulation and export licences.

Pest detection is currently carried out by human visual inspection, which is not reliable or sensitive enough to spot all infestations.

*"One of the challenges of the FCM is that it is very tricky to see and often the fruit is damaged before the farmer can identify that they have a problem,"* explains Martin de la Harpe, Corporate Social Responsibility (CSR) and Sustainability Consultant at Flamingo, *"so having a tool to support that is critical."*

In early 2022, the Global Alliance Africa team at Innovate UK KTN launched an Open Innovation (OI) competition for innovative solutions to detect and identify FCM within chilli plants, at any stage of the value chain including production, harvest, grading or packaging.



1. [fao.org/kenya/fao-in-kenya/kenya-at-a-glance/en](https://www.fao.org/kenya/fao-in-kenya/kenya-at-a-glance/en)

2. [iuk.ktn-uk.org/programme/africa](https://iuk.ktn-uk.org/programme/africa)

3. [iuk.ktn-uk.org/opportunities/approaches-to-managing-false-codling-moth-in-horticultural-crops](https://iuk.ktn-uk.org/opportunities/approaches-to-managing-false-codling-moth-in-horticultural-crops)



A solution was sought to complement a parallel Open Innovation (OI) pilot project with the engineering and environmental consultancy, RSK ADAS<sup>4</sup> on controlling and eradicating the FCM infestation.

Through the open competition, Flamingo selected to partner with Petiole<sup>5</sup>, a UK-based agritech start-up developing mobile solutions based on computer vision and machine learning (artificial intelligence, AI) for yield prediction of plant crops for farmers.

The potential for machine learning to provide faster, cheaper and more effective solutions to addressing agriculture challenges has shown enormous potential in recent years<sup>6</sup>. However, the FCM problem required Petiole to take a new direction in its experience developing innovative AI solutions for agricultural use.

*“We developed the innovation from scratch for this challenge because it’s not only about the counting or recognising [which our Petiole Pro app already does], but also about understanding whether the pest is inside or not,”* says Maryna Kuzmenko, co-founder of Petiole.

The UK government is propelling the race for the UK to be a **global leader in AI development** and in ensuring AI Safety is at the forefront of regulations<sup>7</sup>. This project between Flamingo and Petiole is therefore paving the way for the integration of UK AI innovations across sectors and across continents **for greater legislative compliance and socioeconomic benefit.**



4. [rskgroup.com/rsk-business/adas](https://rskgroup.com/rsk-business/adas)  
5. [petiolepro.com/about](https://petiolepro.com/about)  
6. [forbes.com/sites/louisacolumbus/2021/02/17/10-ways-ai-has-the-potential-to-improve-agriculture-in-2021](https://forbes.com/sites/louisacolumbus/2021/02/17/10-ways-ai-has-the-potential-to-improve-agriculture-in-2021)  
7. [time.com/6287253/uk-rishi-sunak-ai-regulation](https://time.com/6287253/uk-rishi-sunak-ai-regulation)

# Project Impact

**The project accelerated a solution that combined two innovations:** a mobile video recording observation platform generating data for the AI development and an Android-based mobile app with an algorithm for the detection of FCM larvae in chilli pepper fruits.

Using the mobile app, the field scouts on chilli farms are now able scan chilli crops on their mobile phones rapidly. With the AI and machine learning algorithm, the app's efficacy will evolve with the increase in data collected at the farms and adapt to meet regulatory requirements by sharing data with KEPHIS.

If successful, this solution will create significant social, economic and environmental impact for chilli farmers. *"The chance of losing a licence because of the presence of FCM is quite high"* explains Martin de la Harpe, *"so [the app] has an important social impact by supporting jobs and keeping farms open."*

For small farming communities, **improved detection of the FCM also brings greater economic security** because early detection of the moth means that breakouts can be contained quickly and effectively, leading to fewer crops destroyed. From an environmental perspective, improved detection solutions also have the potential **to decrease use of pest control chemicals on a mass scale.**

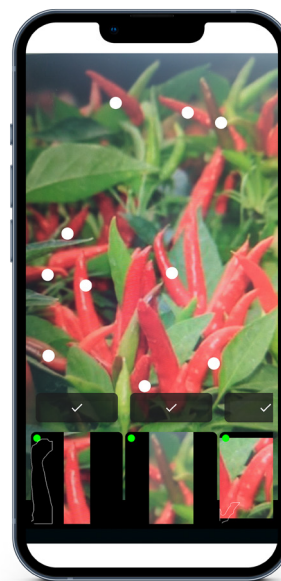


Figure 1: Scanning Chilli Peppers

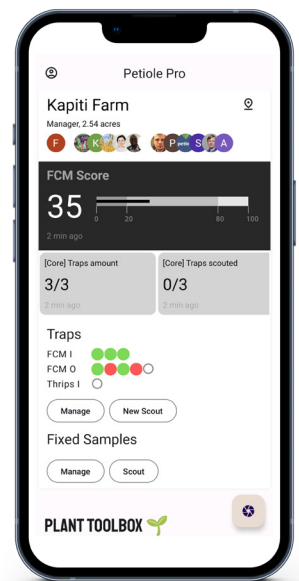


Figure 2: Data Dashboard in App

A local farmer from one of the farms where the Petiole app was trialed highlighted the significance on this initiative for the local community by stating that, *"Spearheaded by Innovate UK KTN, the strategic partnership has resulted in a transformative innovation in pest management, with a laser focus on combatting false codling moths."*

*This collective endeavour has robustly bolstered our agricultural protocols at their foundational level, thereby guaranteeing an export process that seamlessly aligns with rigorous standards."*



# Next Steps

The collaboration between Petiole and local farmers in Kenya, through Flamingo, has demonstrated the adaptability of digital technologies to address agricultural inefficiencies and to improve crop yields and livelihoods.

There are tangible benefits to harnessing the versatility of AI and machine learning for rapid detection of FCM. Machine learning provides significantly greater effectiveness and efficacy than visual identification by scouts.

The development of a mobile app that is accessible and affordable for farmers and scouts on existing mobile infrastructure is an important motivation for Petiole to get involved in this project.

*“We know how challenging it is to compete with huge agricultural producers... but a small farmer who contributes to their local community also needs tools. Most people don’t have access to specialist equipment, but everyone can use a mobile application,”* explains Maryna Kuzmenko.

Emmy Chirchir - Science Technology and Innovation (ST&I) Advisor and Cluster Lead, East Africa Research and Innovation Hub also highlighted that, *“Through this collaborative and co-creative open innovation process, the UK aims to support businesses, innovators and academics to accelerate ambitious ideas into real-world solutions. This will also contribute to strengthening the capacity and resilience of Kenya’s innovation systems.”*

Going forwards, Petiole is keen to rollout across Flamingo’s farms in Kenya, as well as **share the technology with other chilli growers in the region.** They are also exploring the opportunity of expanding the app’s scope to manage risks associated with other pests and other crops.

Maryna Kuzmenko continues. *“We see this as a chance to support equality, including gender equality, because we don’t have any limitations for who will use our solution. We provide free access so if a small-scale female farmer wants to use it, we are happy to provide it.”*

The team at Flamingo are also keen to see this technology shared more widely, including collaboration with other agencies to support an innovative start up to interact with global supply chains.

## About Global Alliance Africa



The Global Alliance Africa project is a six-year project funded by UK International Development through Innovate UK (GCRF) and the Foreign, Commonwealth and Development Office (FCDO).



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KTN



**If you would like more information  
please contact Babar Javed**

**Babar Javed**

Open Innovation Lead - Global Alliance Africa

✉ [babar.javed@iuk.ktn-uk.org](mailto:babar.javed@iuk.ktn-uk.org)

@IUK\_KTN

[iuk.ktn-uk.org](http://iuk.ktn-uk.org)

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