



COFFEE BERRY BORER MODELLING FOR KENYAN COFFEE PRODUCTION

Locations Kenya

Dates 01/12/2023 - 30/06/2025

Summary

The coffee berry borer is a major coffee pest worldwide, threatening farmers' livelihoods and the production of coffee. In Kenya, the pest is a particular problem in low-altitude zones and can cause up to 80% losses. Erratic rainfall and other effects of climate change are making it hard to break the pest lifecycle. In this project, CABI used its tried and tested PRISE model to compile a comprehensive risk assessment of the Kenyan coffee sector and create a model specific to the coffee berry borer in Kenya. With partners, the project aimed to empower farmers and stakeholders within the coffee value chain with actionable advice derived from data and modelling.

The problem

[Coffee berry borer \(CBB\)](#) is a significant constraint to coffee production globally and is present in coffee-growing regions in Kenya, including low-altitude zones.

CBB reduces the quantity and quality of coffee produced. It causes berries to fall prematurely and destroys the taste, making the beans unsaleable. The resulting losses are economically damaging to farmers' incomes, impacting heavily on their income and their livelihoods.

Climate change amplifies the impacts of other risks for smallholder farmers, such as extreme weather and pests and diseases, expanding the range of areas at risk of CBB.

Control methods for the CBB include manual or cultural control whereby farmers collect fallen berries or deforest areas for expansion, or chemical control which exposes farmers, their families and other biodiversity to hazardous chemicals. Neither of these are sustainable. Biopesticides do exist for CBB and they offer a more environmentally friendly alternative.

For farmers, knowing when to act on CBB invasions can help farmers integrate better coffee farming practices. In a [previous project in Colombia](#), CABI developed a model to predict the risk of CBB infestations using Earth observation and climate data. The information produced enabled farmers to identify the best time to intervene.

Additionally, emerging, and uncertain new regulatory landscape compliances, such as the EU Deforestation Regulation, to demonstrate compliance with full traceability of the coffee value chain is adding additional pressure for growers.

What we are doing

The project's aim was to establish an integrated value chain for the coffee industry, using Kenya as a pilot country.

The objectives were to empower farmers with actionable insights, therefore enhancing the value of their holdings, while delivering necessary legal verification sought by coffee traders, wholesalers, and other stakeholders for existing and forthcoming regulations.

As part of this project, CABI focused on conducting a comprehensive risk assessment review of the Kenyan coffee sector and addressing the risk of CBB by undertaking ground verification of the existing model, developed in a prior CABI project, and further modelling.

Data to increase the resilience, traceability and sustainability of this supply chain was produced by using modelling techniques to provide insights into deforestation and pest risk for smallholders and commercial coffee producers.

By integrating Trade in Space's geolocation-based sustainability and risk verification, Farmer Connect will leverage this data to offer EU Deforestation Regulation compliance with full traceability for farmers and operators. This will allow farmers and farmer associations to receive tailored crop management advice while ensuring regulatory compliance for exporters and importers.

CABI collaborated with the Kenya Agricultural & Livestock Research Organisation (KALRO) Coffee Research Institute (CRI) to understand the Kenyan coffee supply chain, the CBBs risk to Kenya, and to adapt CABI's existing CBB model to Kenya. Key activities included:

- Liaising with stakeholders and the coffee agriculture community in Kenya through CRI and CABI's centre in Kenya to compile a comprehensive risk assessment of the Kenyan coffee sector
- In season, infield data collection, including coffee phenology, pest phenological development information and weather data, which was gathered by CRI staff who were trained by CABI on data collection
- A farm management survey to capture contextual data on farm structure, shade, altitude and management practices to support the interpretation of phenology and pest patterns; crop phenology tracking of flowering, fruit development and ripening stages was used to trigger key stages in the cascade pest model
- CBB modelling calibration and validation using the infield data collected. This included calibrating emergence predictions and position information and in-situ climate monitoring (rainfall, temperature and relative humidity)

sensors alongside manual rain gauges) which provided key microclimate inputs for the phenology and pest models.

Results so far

CABI worked closely with the KALRO CRI and coffee growers to collect data necessary to calibrate and update the PRISE CBB model for Kenya. The validated model follows the cascade model system which can predict the emergence of CBB and provide accurate timings for intervention strategies.

The model generates practical, location-specific outputs – such as alerts indicating when farmers need to act against CBB, and forecasts predicting key coffee growth stages like flowering, berry expansion, and harvest timing. Together, these outputs support farmers with timely, evidence-based decision-making to protect yields and improve the quality of their coffee.

CABI also trained six CRI officers and five farmers on data collection which included coffee phenology, pest phenological development information and weather data, focusing on Kirinyaga County.

CRI has highlighted the need to scale the initiative nationwide, beyond the pilot sites and deliver the advisories and time-to-act messages directly to coffee farmers across Kenya to reduce the damage caused by CBB to the Kenyan supply chain.

Donors

Innovate UK, Innosuisse

Partners

Farmer Connect, Trade in Space, KALRO Coffee Research Institute (CRI)

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