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**Integrated white stem borer management in  
smallholder coffee farms in India, Malawi  
and Zimbabwe**

**Summary of the final report**

## **Background**

1. This document contains a summary of the final report of the project entitled 'Integrated white stem borer management in smallholder coffee farms in India, Malawi and Zimbabwe' which was submitted by the Project Executing Agency, CABI Africa.
2. The project commenced in June 2002 and ended in June 2007. The participating countries were India, Malawi and Zimbabwe.
3. A copy of the full report is available on request from the Secretariat.

## **Action**

The Council is requested to note this document.

# INTEGRATED WHITE STEM BORER MANAGEMENT IN SMALLHOLDER COFFEE FARMS IN INDIA, MALAWI AND ZIMBABWE

## Summary of the final report

### Project background

One of the most serious threats to coffee production in Southern Africa is the white coffee stem borer, *Monochamus leuconotus* (Pascoe) (Coleoptera: Cerambycidae). *M. leuconotus* is endemic to Africa and mainly attacks Arabica coffee grown at altitudes of below 1,700m where it may make the cultivation of coffee uneconomical. The larvae feed on the bark forming rings and finally bore into the coffee stem, weakening the plant and causing yellowing of the foliage. Infested trees that are less than two years old are inevitably killed, and a high percentage of older trees also succumb. Routine crop losses of more than 5% have been attributed to stem borers throughout Africa, although Schoeman (1994) reported cumulative yield losses of up to 25% in South Africa, and on smallholder farms in northern Malawi, incidences of up to 80% have been recorded (Oduor and Simons, 1999).



Coffee stem borer (CSB) was previously managed by application of Aldrin and Dieldrin. However these chemicals have been banned due to their persistence in the environment and subsequent threat to non-target organisms. CSB appears to have re-emerged as a serious pest in both Malawi and Zimbabwe following the withdrawal of these insecticides. There was therefore a need to develop alternative methods for managing this pest. As a result a project entitled 'Integrated white stem borer management in smallholder coffee farms in India, Malawi and Zimbabwe' (CFC/ICO/18) was developed. The project was funded by the Common Fund for Commodities (CFC), and supervised by the International Coffee Organization (ICO), with CABI as the Project Executing Agency (PEA).

### Objectives

- i. To undertake a baseline socio-economic survey in order to review present practices, their cost-effectiveness, the level of uptake by farmers, and problems and perceptions.
- ii. To conduct a biological survey in order to quantify the effect of a range of agricultural and environmental parameters on the incidence of CSBs and their natural enemies.
- iii. To screen a range of coffee varieties of selected physiological ages to ascertain their resistance to CSBs.
- iv. To identify natural enemies (parasitoids, predators and/or pathogens) of CSBs, evaluate their potential and initiate rearing programmes.

- v. To establish field trials to quantify the efficacy and potential of control methods including improved agronomic practices, safer pesticides, botanical repellents and pheromones, involving farmer participatory research approaches as far as possible.
- vi. To develop and facilitate improved extension mechanisms through training of trainers and extensionists that will enable technology transfer using farmer participatory approaches.

### **Major outputs**

*The Baseline socio-economic surveys* gave substantial information on farmers' past practices, their cost-effectiveness, the level of uptake by farmers, and their problems and perceptions of CSB.

*Biological surveys* were undertaken to evaluate the effect of a range of agricultural and environmental parameters on the incidence of CSB and their natural enemies.

*Field trials* to quantify the efficacy and potential of control methods including improved agronomic practices, safer pesticides, botanical repellents and pheromones, involving farmer participatory research approaches as far as possible provided the following conclusions:

- a) An integrated management strategy, involving control measures obtained from project trials was recommended, including adult stem borer hand picking, bark smoothening, chemical treatment (quarter rate of Fipronil or Chloropyrifos), hunting for larvae, and uprooting and burning infested coffee trees.
- b) Bark smoothening was recommended to be done in October/November each year just before the flight period and then two months later to destroy the young larvae in Southern Africa.
- c) Hand picking of larvae should also be done promptly before extensive damage occurs so that the trees can recover their full potential.
- d) All the coffee trees that have lost their economic potential due to stem borer should be uprooted during the course of attack and should be promptly burned before the larvae hatch into adults. It is expensive to uproot all attacked trees unless the CSB incidence is more than 50% and the coffee is less than six years old because the death rate tends to be higher in young coffee trees than in mature trees.

### **Costs and benefits of uprooting versus maintaining coffee plants infested with White Stem Borer**

- The project recommended that all trees that are heavily damaged by stem borers and are likely to die or take long to recover economic yields should be uprooted and burned e.g. fields with over 60% borer damage should be uprooted in order to avoid incurring losses, because the overall benefits from such a field may not cover costs since most trees will be bearing below their full potential

- Uprooting should be avoided if a farmer can hand-pick and kill the larvae because recovering trees have an economic yield and have the potential to recover fully
- Farmers should as much as possible use preventative methods to control stem borers because they will also have an added advantage of minimizing crop damage

### **Impact assessment of coffee stem borer project in Malawi and Zimbabwe**

An impact assessment of the project was carried out in both Malawi and Zimbabwe. This was an internal exercise by the Project Executing Agency. The major findings included:

- The project developed and disseminated three CSB control methods to farmers in both Malawi and Zimbabwe i.e. chemical, cultural and physical methods
- The level of uptake of the CSB control technologies was higher in Malawi compared to Zimbabwe
- In terms of specific outputs; the level of CSB infestation decreased in the target areas in both Malawi and Zimbabwe due to implementation of project activities and adoption by farmers of technologies, developed by the project, to control CSB.
- The numbers of farmers attempting to control CSB is increasing in both countries
- The significance of coffee as a farm enterprise is improving. This is attested to by increases in the area under coffee, coffee output, number of coffee trees on the farms, income received from coffee and the number of farmers that have invested in coffee over the last three years (within the project period)

### **Way forward**

Substantial CSB control technologies and extension strategies such as Farmer Field School participatory approaches have been generated. However, there is a need to scale-up the findings to countries affected by CSB outside the three participating countries. Some nearby countries have benefited from the findings to some extent, but more farmers could benefit in the non-participating countries where CSB is a major constraint to coffee production, and improve productivity. A dissemination-oriented project for countries outside the project areas could facilitate the use of technologies and strategies from the project.