

TWO DECADES OF MANAGING THE COFFEE BERRY BORER – INDIA'S EXPERIENCE

In India, both Arabica and Robusta coffees are cultivated in about 388,000 hectares in the States of Karnataka, Kerala, and Tamil Nadu, constituting the traditional coffee growing area and in the Non-traditional areas of Andhra Pradesh and Orissa and the North-Eastern States.

It is almost twenty years since the coffee berry borer was recorded for the first time during February 1990 from a coffee growing region in South India. Over the years it has gradually spread to more areas and is now prevalent in almost all the coffee growing zones in the States of Karnataka, Kerala and Tamil Nadu (88% of the coffee area in India). It has not spread to the Non-traditional areas of Andhra Pradesh and Orissa and the North-Eastern India (12% of coffee area in India).

As the pest was a new entrant, both for the coffee growers and scientists involved in coffee pest management, a massive survey involving the Plant Protection, Quarantine and Storage Department of the Agricultural Ministry, Government of India and the stake holders was conducted to assess the spread and recommend measures to be adopted to check further spread. By February 1991 the berry borer was found on coffee in Kodagu District, the largest coffee growing region in India. From November 1991, as there was no other better method available at that time, to check the pest the Coffee Board of India launched a programme to supply pesticide and plant protection equipment at subsidized rate to the growers. This had a telling effect on the control of the borer as the coffee growers took up sprays and the Coffee Board Extension Department started conducting innumerable workshops, seminars, and village level meetings using audio-visual aids to reach out to the growers. In November 1992 the pest act was invoked by the Government of India, which specifically restricted movement of coffee from infested areas to uninfested areas. Coffee curing establishments were identified and the coffee growers from berry borer affected areas were advised to process their coffee only in these curing establishments.

All along, from the first days of detection, research on the bio-ecology and management of the berry borer were being conducted. During September 1995, through the Project Directorate of Biological Control, Bangalore (earlier Commonwealth Institute of Biological Control) the berry borer parasitoids namely, *Cephalonomia stephanoderis* and *Prorops nasuta* were imported and two scientists trained on rearing of the parasitoids. By January 1996, the first release of the parasitoids was done on a few estates in Kodagu.

With a better understanding of the biology and behavior of the berry borer, a set of practices were advised to be followed by the growers to keep the incidence at manageable levels. The first and foremost being the phyto-sanitary and cultural measures to keep the coffee bushes at reasonable sizes to aid in complete collection of all the berries at the time of harvest, cut down all the tree coffees planted around the boundaries to restrict berry borer from breeding on them and becoming the source of inoculum for

carry over of the pest from one seasons crop to the next. Regulating the size of the coffee plants permitted better insecticide coverage while undertaking hot spot sprays. Further, strict drying standards were enforced to prevent berry borer from breeding in the dry coffee parchment and cherry. In between, the Governments of Kerala and Karnataka State pitched in by invoking the Pest Act banning movement of coffee from infested areas to un-infested areas.

From the time the berry borer was noticed, strict instructions on preparation and transport of seed coffee were communicated to all the stakeholders. It was made mandatory to treat the seed coffee with an insecticide, whether or not the berry borer was noticed. No seed coffee was allowed to be transported to berry borer free areas. This rule is still in force, especially in the case of seed supply to Non-traditional areas and North-Eastern States.

During December 1995, the Government of India sanctioned the Project - National Mission on Control and Prevention of Coffee Berry Borer. Under the project the extension activities were intensified and door to door campaigns were conducted to educate the coffee growers on all aspects of berry borer management, especially the use of picking mats and the risk involved in transporting coffee from one region to the other.

In January 1998 the CFC-ICO Project on Integrated Management of Coffee Berry Borer was launched. Under the aegis of this project the Research and Extension activities got a fillip with the availability of more *ad hoc* project staff and vehicles. The Project also facilitated five entomologists to undergo training on mass production of parasitoids like *Prorops nasuta* and *Phymastichus coffea* at the CENICAFE, Colombia. All the five entomologists are even today involved in some aspects or the other of berry borer management. Two scientists were also trained at the Insect Mass Rearing Laboratory at USDA, ARS, Mississippi State University, USA. Three scientists were trained on Farmer Participatory Approaches in Extension at the CATIE, Nicaragua. Except one, all the scientists who were trained on CBB are still in the service of the Coffee Board of India in various capacities, either in extension or research.

Arabica harvesting in India is completed each year within a narrow window of a few months, usually from December to January. In most cases it does not take more than two months. Hence, as the coffee berries remain for a shorter time on the plants from the time of bean hardening to ripening, the incidence of berry borer is much less on arabica. But in the case of Robusta, harvesting takes more time as the berries ripen more slowly and so the incidence is more as the berry borer completes several more generations.

Though three parasitoids were introduced from Mexico and Colombia and rearing and release started, it was possible to continue rearing and release of only one parasitoid viz. *Cephalonomia stephanoderis*. The culture of the other two parasitoids, *Prorops nasuta* and *Phymastichus coffea* could not be maintained. Till date 6,100,000 *C. stephanoderis* wasps have been released in the field. Though parasitoid recovery was made from release and non-release sites, the effect was not encouraging. Due to meticulous removal of left over fruits and gleanings after every harvest season, and non-

availability of berry borer larval and pupal stages in the left over fruits the parasitoid could not sustain itself and has to be replenished every year by mass release.

The search for indigenous natural enemies led to the discovery of a few natural entomopathogens, among which the coffee berry borer strain of *Beauveria bassiana* was found to be very promising. This strain has been isolated, purified and a simple method to mass produce them developed. The coffee growers are being trained on the technique of production and encouraged to take up mass rearing by taking pure culture from the Coffee Research Stations.

Another weapon in the fight against the coffee berry borer is the use of broca traps. The present Indian model of the trap, which is durable and user friendly, has evolved after several years of experimentation with the funnel traps and the bottle traps. The lure used is a combination of Methyl and Ethyl alcohol. Growers have been advised to set up traps around the drying yards, especially when the gleanings and left over fruits are spread on the yards for drying. The traps are also set up in the plantations to trap beetles escaping from the gleanings and left over fruits, particularly when there is an increase in humidity due to rain or irrigation. The use of traps has been very well taken by the growers and several thousands of the traps have been distributed.

The spread of the coffee berry borer was rapid during the first five to six years of its detection with an annual average increase of 35%. But due to the effective use of the recommended interventions, the spread declined to about 5.1% from 1996 onwards to 2001. Till 1995, the Coffee Board had total control over the marketing of coffee in India and so the movement of coffee within the plantation area was restricted. The advent of free marketing of coffee made it a strictly private sector activity and movement of coffee within the plantation districts was unrestricted. Hence, berry borer incidence started off in the hither to unaffected areas, which were isolated from the infested areas. For example, this happened in an area in Chikmagalur District in 2002 which was completely free of berry borer till then. Since the advent of free marketing the berry borer has been spreading gradually and is now present in almost all the tracts of the traditional coffee growing States. From 2001 to 2009 the annual average spread is around 6.5%.

The coffee growers are well aware of the measures to be adopted to keep the berry borer threat in check. But the latest threat is from the phenomenon of climate change. Any change in the rainfall pattern may send things out of gear. This did happen with unusual early rains during the month of February during 2008, when the harvest was not complete, and continuous rains from then on till August. This rain caused fruit drop on robusta coffee and wherever the gleanings and left over fruits could not be collected, the incidence of berry borer was slightly higher, especially on robusta crop which was picked towards the end of the harvesting season.

The Indian coffee grower is armed well with several options to take care of the coffee berry borer infestation.

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