

# PERFORMANCE OF INTEGRATED CASHEW IMPROVEMENT PROGRAM USING WEAVER ANTS AS A MAJOR COMPONENT FOR MAJOR INSECT PESTS MANAGEMENT ON CASHEW PLANTS

La Pham Lan



Vietnam has been ranked as one of the most important countries in cashew production in the world since 2000. Cashew (*Anacardium occidentale*) is an important crop for small households in Vietnam. Cashew is planted mainly in inverse soils that are low fertility and with low precipitation. For years, cashew plants were considered as a forestry plant so that the growers did not pay consideration to any intensive techniques such as fertilization or plant protection. Otherwise, the productivity of cashew remains low level because of serious damage from insect pests and inadequate farm management. To achieve high yield, most growers strongly rely on pesticides and chemical fertilizers, resulting in high production costs, farmers' health problems, pest resistance, environmental pollution and the reduction of natural enemies and pollinators. In some cases, the efficacy of insecticides was not proven due to misuse and farmer use of insecticides as a preventive tool.

In order to make cashew production safe, sustainable and profitable, an integrated cashew improvement (ICI) program is needed in which using a biological agent as weaver ants (*Oecophylla smaragdina*) instead of insecticides has potential as a control measure of insect pest on cashew. Cashew growers in Australia, Papua New Guinea and Mozambique had successfully used an IPM program that used weaver ants as a key element. Beside, the use of weaver ants as a biological control agent of insect pests is common in the Mekong Delta,

Vietnam. This ICI program supported by CARD-AusAID that was being conducted in the collaboration with scientists from Charles Darwin University, Australia. The main activities were to develop an ICI program (curriculum) that will work in Vietnam conditions, and to conduct Training of Trainers (TOT) training in ICI program for TOT trainers to conduct farmer field schools in their local regions.

To assist the cashew IPM TOT training program, field experiments, field surveys and observations, laboratory experiments and rearing were conducted in Binh Phuoc, Dong Nai and Dak Lac provinces between July 2006 and March 2008. Three long term experiments were conducted in three demonstration orchards: Dong Xoai (Binh Phuoc prov.), Hung Loc and Trang Bom (Dong Nai prov.). Each demonstration orchard is about 2.0 ha, divided into two treatments. One treatment was managed by the orchard owner with his current farming practices including insecticide sprays. The

other was managed by the ICI program in which weaver ants used as a major component of control measure of cashew insect pests. Around the ICI plot, a row of cashew trees was used as a buffer zone. The other farming activities, such as weeding, pruning, fertilizer application and the use of fungicides, were done the same for the farmer's plot and the ICI plot.

Data obtained from the field experiments and field surveys showed that:

- The common insect pests damaging flushing terminals, cashew apples and/or nuts were tea mosquito bugs, shoot borers, coreid bugs, thrips, apple-nut borers, leaf rollers, leaf miners, aphids and mealy bugs, among which tea mosquito bugs, shoot borers, leaf rollers and apple-nut borers were the major pests during the flowering and fruiting period. The branch borer and the stem-root borer were the major pests damaging branches and trunks.
- Weaver ants were similar to insecticides for controlling a range of insect pests, such as tea mosquito bugs, shoot borers, apple-nut borers, leaf rollers and leaf miners.
- Cashew yields were similar between the ICI plot and the farmer's plot, but nut quality was higher in the ICI plot than in the farmer's plot because of the foraging behaviour of weaver ants.
- Mealy bugs and aphids, that are currently determined to be minor pests, were unlikely to become major ones after the main pests are controlled by weaver ants. A total of 12 species of natural enemies of aphids and 9 species of natural enemies

of mealy bugs were determined, and these natural enemies were more frequently seen in the ICI plot than in the farmer's plot, showing that when weaver ants were present, mealy bugs and aphids were present, and predators and parasitoids of these pests were also present, resulting in very little damage to the cashew crop.

- The key to successfully manage the ICI plot was to keep weaver ant populations high and stable. The boundary fighting between weaver ant colonies and the competition between weaver ants and other ant species were determined to be very important for the reduction of weaver ant populations. Solutions for these competitive interactions were provided and discussed.

Data obtained from field observations, laboratory experiments and rearing showed that

- A soft chemical (Abamectin) was effective in controlling thrips, on which weaver ants have a little effect, and it was not harmful to weaver ants.
- The bio-ecology of the branch borer and the stem-root borer were extensively studied. Based on their ovipositing behaviour, initial damage symptoms and their life cycles, an integrated management strategy for each of the pests was recommended. These strategies include three components (monitoring, removal of young larvae based on initial damage symptoms, and chemical injection).
- Control strategies developed for thrips, branch borers and stem-root borers are compatible with the other components of the cashew IPM program.