The development of the *Anagyrus lopezi* in Thailand

Since the widespread destruction of the tapioca fields by the deadly mealy bugs, *Phenacoccus manihoti,* a couple of years ago, Thailand tried to eradicate the insects by spraying with the thiamethoxam insecticide and adopting proper cultural practices. In the second half of the year 2009, the government allocated an additional budget of Baht 66 million to the Ministry of Agriculture and Cooperatives, primarily to the Department of Agricultural Extension. Packets of the thiamethoxam insecticide were distributed to tapioca farmers in the affected areas around the country. Detail of good practices on crop management was delivered at the meetings with the farmers and also via mass media. The efforts paid off to a certain extent. However, it was later found that the mealy bugs kept coming back, after the effects of the thiamethoxam wore off and when the weather was drier. The farmers could not bear the costs of clearing the tapioca fields and replanting with new tapioca cuttings. At the same time, entomologists at the Department of Agriculture sought other ways of eradicating the mealy bugs and found that in 1970's the African continent was devastated with the destructive insects, and scientists released the *Anagyrus lopezi* parasitoids to counter them. The problem was gradually and effectively brought under control. Efforts were then made to secure 500 *A.lopezi* from the International Institute of Tropical Agriculture (IITA), headquartered in Benin.

Since October, 2009 the Department of Agriculture started to multiply the parasitoids at its main office in Bangkok and the Rayong Upland Crop Research Centre in the Eastern region. Tests on host specificity were carried out so as to ensure that the wasps were not harmful to the environment, including *in situ* insects. Later in July the following year, the results were submitted to the National Plant Protection Committee and an approval to release the *A.lopezi* was subsequently made.

In November,2009 a first batch of the *A.lopezi* wasps was sent to the Thailand Tapioca Development Institute at Huay Bong for in-house multiplication. A number of production trials was conducted, such as selection of containers or cages, determination of size of the cage and the mesh used, selection of suitable medium for mealy bugs, control of temperature, moisture and sunlight etc. Several buildings were constructed or converted for these purposes. As part of the joint project the TTDI supplied the buildings, space and other hardwares, while the DOA provided a group of entomologists led by Dr Amporn Winothai to head the project and to advise the TTDI staff on production technique. In January, 2010, *A.lopezi* wasps were first released within the TTDI Huay Bong compound which covered about 600 hectares. Four months later, the mealy bugs were effectively under control. Fewer mealy bugs were found, while the *A.lopezi* and local parasitoids such as lace wings become more common and plentiful.

By July, 2010, several hundred thousands of the *A .lopezi* were produced ; most of them were released in tapioca fields, not only in Huay Bong but also in other areas. The tapioca associations, comprising mainly tapioca drying plants and starch mills, in the attempt to save the industry, started to produce and distribute the *A*. *lopezi* among their members and farmers in their localities. Staff of the Departments of Agriculture and Agricultural Extension and leading farmers were trained on mass-rearing of the *A*. *lopezi* so that they could be raised and multiplied in regional centres around the country and among the farmers in the tapioca-producing areas. With these concerted efforts by the TTDI Foundation, government agencies, the private sector, and the farmers, it is expected that the mealy bugs will effectively be under control within this planting season.