Ecofriendly practices assist in controlling coconut mite

A. Vakeesan and G. Mikunthan

Coconut, *Cocos nucifera* (Arecaceae) is one of the most valuable perennial crops of the humid tropics. In Sri Lanka, it is grown in the coastal regions, and is seen as one of the key plantation crops because it contributes to the country's economy and is a main part of the daily diet of the average Sri Lankan, providing 25 percent of the daily calorie intake.

The coconut mite (CM), *Aceria guerreronis*, has emerged as a main coconut pest after being introduced to the island in late 1997. The sudden outbreak of this pest in coconut plantations threatened the copra industry in Sri Lanka, reducing yields and economic returns. This has drawn the attention of researchers, traders and the farming community as it threatens the livelihoods of millions. CM control is not yet successful for many reasons. Coconut is a tall tree, and manipulation of this ecosystem is extremely difficult. Studying pest occurrence and treatments is very difficult. CM completes its life cycle within 8 - 15 days, and thrives in the favourable conditions on the island throughout the year, spreading mainly by wind. Various chemical control measures have been recommended, but most of them are unsuitable, as they do not control the tiny mites successfully, are extremely poisonous, and carry the risk of eliminating parasites and predators of mites rather than controlling CM.

Hence a need has arisen to look for alternative control measures. A study was undertaken by the Department of Agricultural Biology of the University of Jaffna, trying to find suitable but eco-friendly measures to manage the CM in the coconut plantations of the Jaffna peninsula. Three thousand palms were assessed, measuring the surface nut damage, from August to December 2005, in different locations in the north of the country to detect mite tolerant varieties. Recommendations were made to coconut farmers based on the assessment and experiences.

Shape and colour of the nuts

It was found that the shape and colour of the nuts determine their susceptibility to CM attack. In the northern part of Sri Lanka, coconuts were round or oval, and the round shaped nuts were completely free from CM attack. It is thought that it is mechanically impossible for the mites to get under the floral parts, which sit very tightly on the nut. The tightness may be affected by the vigour or condition of the plant.

In Jaffna, 'dwarf green', 'dwarf brown' and 'king' coconut types are commonly grown. These cultivars may be grouped according to the colour of the nut. Assessment was done by quantifying the scarring of the nut surface. Among the cultivars, the dark green had the least mite damage. This might be due to the presence of wax on the surface of nuts. It is believed that

Photo: A. Vakeesan

Managing CM in coconut-based ecosystems presents a variety of challenges.

the cultivars have different amounts of wax on the nut surfaces. This may restrict the mite finding and settling on the nut. Hence, recommendations have been made that round shaped and dark green are the twin agronomic aspects of the coconut that help to guard against the CM attacks.

Keeping the brown

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Mr. Manickavasagam is an organic farmer living in North Poigainallur, a coastal village in Nagapattinam, in the state of Tamil Nadu. His farm escaped unaffected while his neighbours' fields suffered total crop losses as a result of the attack of the brown plant hopper (*Nilaparvata lugens*, or BPH) in 2005.

For several years, Mr. Manickavasagam has been interested in organic farming. In 2005, with the assistance of Kudumban, a local NGO, he tried following the System of Rice Intensification (SRI) method. He transplanted his seedlings in October 2005, paying special attention to the spacing between them. He added four tons of farmyard manure to his 0.78 acre field, and 150 kg of azolla was applied 15 days after transplantation. He also sprayed *panchakavya* and *amirtha karaisal*, two organic inputs traditionally used in this area, prepared by fermenting cow urine, ghee and curd. These inputs proved their value by providing strength and greater resistance to the crop. This was clear after the heavy rains and floods of December 2005. In addition, everyone in the village witnessed with curiosity and surprise how all adjacent fields became severely affected by the brown plant hopper, while they were hardly visible in the SRI plot.

Mr. Manickavasagam decided to document the differences between his and his neighbours' fields, receiving the help of the farmers participating in Kudumbam's training courses. The first

Cropping System

The Coconut Cultivation Board in Jaffna is trying hard to extend coconut cultivation, and regularly provides farmers with advice. However there are few extension workers for coconut, and most farmers in Jaffna lack access to information, especially for mite control. Intercropping with the multipurpose leguminous tree, *Gliricidia sepium* is recommended by the Coconut Research Institute (CRI) and is well practised by the farmers. Intercropping of pineapple has also been successful in the western part of the Jaffna peninsula. Mixed cropping systems, as well as those with good ground sanitation, showed low mite infestations, except for mixed coconut gardens with banana, which recorded the highest mite infestation. Banana uses large amounts of potassium, the lack of which in coconut may affect its water retention capacity. Mixing banana with coconut is therefore not advised.

Many coconut gardens are poorly maintained. Improper nutritional management may also cause increased mite attack. Moisture stress slows the growth of the nuts, which is thought to cause looser attachment of the nut to the floral parts, allowing space for the mites to enter and multiply quickly. In the urban areas of the northern region of Sri Lanka, especially in Jaffna, coconuts are cultivated around wells. After bathing, the water flows from the drainage channel and is used for irrigation. Better nutrient management is also practised by adding kitchen wastes, organic materials and fallen coconut leaves as compost manure. A half-circle trench is dug one metre away from the base of the tree, is filled with these organic plant wastes and covered. In the next season the other half of the circle will be filled and covered. CM attack has been reduced with this practice.

One farmer has successfully managed coconut mite using smoke. Fallen coconut leaves were burnt beneath the dwarf palms together with cuttings and leaves from neem bushes. Thick white smoke rises towards the bunches of coconuts. This practice gave an encouraging result, with a much lower CM incidence over three months. It is thought that the neem smoke and the substances left on the bunches repel coconut mites.

Conclusions

It is still too early and difficult to say whether CM can be controlled by natural agents in the field. We should, however, consider the agronomic aspects of the nut when recommending how to control CM. By developing varieties with favourable characteristics (i.e. round shaped and dark green nuts), crop breeding may help, but this is a long term and probably only partial solution to the pest.

General recommendations can be made that by maintaining a healthy coconut farm, following good management practices like irrigation, smoking with neem, regular compost application, and selecting suitable varieties, pest incidence can be reduced. ■

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plant hopper at bay with SRI

Photo: Authors

Wide spacings in SRI contribute to pest management and healthy crops.

observation referred to the spacing between seedlings: planted at 10 x 15 cm distances, there was no space between rows or hills when the conventional crop reached its maximum tillering phase. Furthermore, the liberal application of urea favoured a lush vegetative growth. This not only encouraged the incidence of the brown plant hopper, but it also contributed to the crop's lodging after the heavy rains. Concerned with the attack of BPH, and following the advice of a pesticide dealer, Mr. Manickavasagam's neighbours sprayed a synthetic pyrethroid, to no avail.

There were also clear differences in the populations of the natural enemies of BPH and other pests recorded in the SRI plot and in the conventional farms. While the first one reported spiders, myrid bugs, beetles and wasps, the conventional farms were devoid of natural enemies. The wider spacing adopted during transplantation (22.5 cm x 22.5 cm) and the consequent free air movement between two hills and rows, even after the maximum tillering phase, together with the presence of natural enemies, helped the plants resist the invasion and multiplication of BPH. Furthermore, the use of organic inputs such as azolla, *panchakavya* and *amirtha karaisal* clearly meant the plants could offer greater resistance.

All village farmers were surprised to see the extraordinary tolerance of the SRI rice plants, while the rice grown all around it succumbed to the pest. While the conventional farmers could not harvest a single grain from their fields, the organic farmer, despite his field being flooded by the rains, harvested an equivalent of 3000 kg/ha. This made the farmers of North Poigainallur clearly aware of the advantages of SRI and of organic farming when facing a severe pest incidence and unfavourable weather conditions. During the 2006-2007 season, naturally, more than 20 conventional farmers decided to try a different approach. ■

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