Biocontrol News and Information ***32***(2), 9N–16N
www.cabi.org/BNI

General News

Papaya Mealybug: a New Invading Pest in West Africa

In December 2009, the Plant Protection and Regulatory Services Directorate (PPRSD), Accra, Ghana requested assistance from the International Institute of Tropical Agriculture (IITA) in Benin for the identification of an unknown mealybug that was severely threatening papaya in orchards at Nsawam in the Eastern Region and Bawjiase in the Central Region, about 30 km North and 60 km East of Accra, respectively. A preliminary determination pointing to the papaya mealybug, *Paracoccus marginatus*, (PM) was soon confirmed by the Plant Pest Diagnostic Center of the California Department of Food and Agriculture, Sacramento, USA.

PM was first described in 1992 from samples collected in its native range in Mexico and Central America, following its introduction to the Caribbean where it became a pest in the early 1990s. It had invaded most of the Caribbean archipelago by 1994 and spread to South America in 1999, the Pacific Islands in 2002, and southern Asia in 2008[1]. More recently, PM has expanded to Bangladesh, Cambodia, the Philippines and Thailand, reaching Reunion in 2010. In West Africa, the first outbreaks of PM detected in Ghana were soon followed by records in coastal regions of neighbouring countries. Thus, in early 2010 the exotic mealybug pest was observed attacking papaya at both Lomé in Togo and Hilacondji on the Benin border. Limited surveys in Benin in the late dry season in March 2011 demonstrated that PM was already firmly established on further host plants (mainly cassava and jatropha) along the main road running from Ouidah to Cotonou and Porto-Novo, a progression of more than 300 km within 16 months. Dense PM populations typically producing ample honeydew and sooty mould seen on papaya on the eastern border of Benin give reason to anticipate spread of the mealybug into Nigeria. Drawing on what happened when another hemipteran papaya pest, the spiralling whitefly *Aleurodicus dispersus*[2], was introduced into West Africa in 1992, it is expected that the PM-infested area will rapidly expand from the coast to inland regions, mainly along major roads.

Paracoccus marginatus is the only one of 86 described species in the genus with the status of an invasive pest outside its home range. With its introduction into West Africa, PM can be added to the list of 21 *Paracoccus* species already known to occur in continental Africa on various host plants. These were all described as native to tropical Africa and have until now remained inconspicuous. With the exception of one species described from Nigeria, all are known only from eastern and/or southern Africa, though one of these species is also recorded from the Indian subcontinent.

Though papaya appears to be the preferred host plant, *P. marginatus* is highly polyphagous. It attacks more than 60 plant species from 29 families including cultivated and horticultural plants, ornamentals, trees, shrubs and weeds, and the list of hosts is steadily growing. Besides papaya, other economically important host plants include cassava, sweet potato, yams, mango, avocado, pineapple, cotton, citrus and cashew. The continuous availability of hosts combined with PM's rapid development, easy dispersal, high survival and remarkable reproductive capacity at temperatures prevailing in tropical Africa favour its rapid expansion through the continent.

Since first reported, PM has caused great concern in the four main papaya-producing regions of Ghana (Greater Accra, Central, Eastern and Volta regions), where about 2500 ha were under cultivation before PM arrived. First estimates indicate that 85% of papaya farms in these regions have been devastated by *P. marginatus* causing average yield losses of 65% and shrinking the papaya orchards to 380 ha. As a result, export earnings for the papaya industry have dropped significantly and 1700 people in the sector have lost their jobs. The economic and ecological impacts of an imminent PM outbreak in Nigeria where, according to FAO (Food and Agriculture Organization of the United Nations), 94% of papaya in West Africa is grown, are likely to be even more dramatic.

As a word of caution, it should be noted that papaya in West Africa often hosts other mealybug species such as *Ferrisia virgata*, *Maconellicoccus hirsutus*, *Nipaecoccus viridis* and *Pseudococcus longispinus*. Since field identification of PM may prove to be difficult, especially at low pest densities, initial infestations of this new pest mealybug often go undetected.

PM populations have been controlled by the introduction of natural enemies in the Caribbean, South America, Florida, Guam[3], Palau and Hawaii. A classical biological control programme was therefore initiated in 2010 as a joint effort between PPRSD Ghana, FAO and IITA. Under the framework of an emergency TCP (Technical Cooperation Programme project), the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) was contracted to provide PM-specific parasitoids from their mass-rearing facilities in Puerto Rico. Arrangements for first consignments to Ghana of the encyrtid endoparasitoids *Acerophagus papayae*, *Anagyrus loecki* and *Pseudleptomastix mexicana* have already been made in order to establish stock colonies at the PPSRD's Biocontrol Insectary, with first field releases planned for 2011. PPRSD has committed to serve as a parasitoid source for Benin or any other African country affected by PM invasions. Given the success of PM biocontrol in Asia and the Pacific, it is anticipated that the joint effort in West Africa will bring PM under complete control within a short time span.

[1] Muniappan, R., Shepard, B.M., Watson, G.W., Carner, G.R., Sartiami, D., Rauf, A. and Hammig, M.D. (2008) First report of the papaya mealybug, *Paracoccus marginatus* (Hemiptera: Pseudococcidae), in Indonesia and India. *Journal of Agricultural and Urban Entomology* **25**, 37–40.

[2] Neuenschwander, P. (1994) Spiralling whitefly, *Aleurodicus dispersus,* a recent invader and new cassava pest. *African Crop Science Journal* **2**, 419–421.

[3] Meyerdirk, D.E., Muniappan, R., Warkentin, R., Bamba, J. and Reddy, G.V. (2004) Biological control of the papaya mealybug, *Paracoccus marginatus* (Hemiptera: Pseudococcidae) in Guam. *Plant Protection Quarterly* **19**, 110–114.

By: Georg Goergen[a] (G.Goergen@cgiar.org), Manuele Tamò[a] (M.Tamo@cgiar.org), Milly E. Kyofa-Boamah[b] (mkyofaboamah@yahoo.co.uk), Aimé H. Bokonon-Ganta[c] (aimehbg@yahoo.com) and Peter Neuenschwander[a] (P.Neuenschwander@cgiar.org).

[a] IITA-Benin, 08 BP 0932, Cotonou, Benin.

[b] Ministry of Food and Agriculture, Plant Protection & Regulatory Services Directorate, P.O. Box M.37, Accra, Ghana.

[c] Direction de l'Agriculture, Service de la Protection des Végétaux et du Contrôle Phytosanitaire, 01 BP 58 Porto-Novo, Benin.

FAO Supports Action against Cassava Mealybug in Asia

The FAO (Food and Agriculture Organization of the United Nations) Regional Office for Asia and the Pacific (RAP) has approved a project to develop pest-spread prevention strategies and biocontrol options to manage the cassava mealybug *Phenacoccus manihoti* in Southeast Asia. Cassava is a major crop used for human consumption, animal feed and bioenergy production in the region, with about three million smallholder farmers deriving their livelihoods from cassava production.

The confirmation of the South American mealybug as the cause of extensive damage to cassava crops in Thailand provoked justifiable alarm throughout the region, given how the pest had laid waste to Africa's cassava in the 1970s. The Thai government, with the help of CIAT (International Center for Tropical Agriculture) and IITA (International Institute of Tropical Agriculture), introduced *Anagyrus lopezi*, the parasitoid that had successfully controlled the pest across Africa. It was released in 2010 in a swiftly but carefully planned response to the emergency (see *BNI* 31(4), 25N).

It is anticipated that introducing *A. lopezi*, together with releases of local biocontrol agents (predatory lacewings) and ecological pest management training of field extension workers and farmers, will help to provide effective control of cassava mealybug, and help prevent its further spread to other countries in the region.

FAO's assistance will include undertaking farmer training programmes to promote biocontrol and integrated pest management (IPM) among the smallholder farmers. Activities will include: (i) research and technical support towards better understanding and management of cassava mealybug; (ii) capacity building for countries in the Greater Mekong Subregion that are currently free from cassava mealybug to enable them both to mass rear *A. lopezi* ready for field releases if/when needed, and to embark on precautionary measures to prevent/delay entry of the pest; and (iii) capacity building for extension workers to enable them to conduct farmer field schools on cassava mealybug, and for farmers to help with recognition of cassava mealybug and its effective management.

Sources: FAO-RAP, IPMnet NEWS
and www.vegetableipmasia.org

Flower Gall Mite Offers Hope in Long Battle against Lantana

You have to be doughty to be a lantana weed biocontrol scientist: some 40 species of natural enemies have been introduced against the weed in 29 countries since classical biological control programmes began over a hundred years ago. Control has been patchy, probably because the many weedy varieties of lantana have wide environmental tolerances, while the biocontrol agents deployed against them have restricted varietal ranges and habitat requirements.

Now the South Africans are reporting that their latest introduction, the lantana flower gall mite *Aceria lantanae*, is established, spreading and having an impact, and are offering starter colonies to other scientists. The mite has established on susceptible lantana varieties at a number of humid, frost-free sites in South Africa, where it is reducing seeding by up to at least 85%. Dispersed by wind and by phoresy on flower-visiting insects, it has been recovered at distances of up to 50 km from the closest release sites within two years of release.

Native to the Caribbean, the mite feeds on the undifferentiated inflorescence bud and induces it to develop into a microphyllous gall instead of a flower-head and fruit-head, thus reducing seed production. This is strategic because lantana is bird-dispersed – as shown by seedlings coming up along fence-lines and on the drip-circle of trees. The mite breeds inside the flower gall. Galling also stunts vegetative growth. By reducing the rate of growth and reproduction of lantana, the mite has the potential to reduce the rate at which the weed becomes denser and spreads. This should reduce the rate of loss of natural pasture and biodiversity, and the frequency and cost of other (mechanical and chemical) control measures.