European and Mediterranean Plant Protection Organization
Organisation Européenne et Méditerranéenne pour la Protection des Plantes

Data sheets on quarantine pests
Fiches informatives sur les organismes de quarantaine

Maconellicoccus hirsutus

Identity

Name: *Maconellicoccus hirsutus* (Green)
Synonyms: *Phenacoccus hirsutus* Green
Taxonomic position: *Insecta*: *Hemiptera*: *Homoptera*: *Pseudococcidae*
Common names: pink hibiscus mealybug, pink mealybug, hibiscus mealybug (English); cochenille de l'hibiscus (French); Hibiscus-Schmierlaus (German)
EPPO code: PHENHI
Phytosanitary categorization: EPPO A1 action list no. 314

Hosts

M. hirsutus attacks a wide range of predominantly woody plants, including many ornamentals. The ornamental *Hibiscus rosa-sinensis* is a typical host which is frequently attacked. Most of the recorded hosts are tropical plants hardly or not cultivated in the EPPO region. Other recorded host plants which could be of significance for the EPPO region are avocado, banana, citrus, cotton, grapevine and mulberry. Host records extend to 76 families and over 200 genera, with some preference for *Fabaceae*, *Malvaceae* and *Moraceae* (Mani, 1989; Garland, 1998).

Geographical distribution

M. hirsutus is native to southern Asia, and has spread to other parts of the world: Africa, and more recently North America and Caribbean, where it is still extending its range (Kairo *et al.*, 2000).
EPPO region: absent
Asia: Bangladesh, Brunei Darussalam, Cambodia, China (Guangdong, Hong Kong, Macao, Shanxi, Xizhang, Yunnan), India (widespread), Indonesia (widespread), Japan (Ryukyu), Laos, Lebanon, Malaysia, Maldives, Myanmar, Nepal, Oman, Pakistan, Philippines, Saudi Arabia, Singapore, Sri Lanka, Taiwan, Thailand, United Arab Emirates, Vietnam, Yemen
Africa: Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Egypt, Gabon, Gambia, Kenya, Liberia, Niger, Nigeria, Senegal, Seychelles, Somalia, Sudan, Tanzania (including Zanzibar), Zaire, Zambia. There is an erroneous record for Algeria
North America: Mexico (1999), USA (California 1999, Florida 2002, Hawaii 1983)
Central America & Caribbean: Anguilla (1996), Antigua & Barbuda, Aruba, Bahamas (2000), Barbados (2000), Belize (1999), British Virgin Islands (1997), Dominica (2001), Dominican Republic (2002), Grenada (1994), Guadeloupe (1998), Guatemala, Haiti (2002), Jamaica, Martinique (1999), Montserrat (1998), Netherlands Antilles (1996), Puerto Rico (1997), St Kitts & Nevis (1995), Saint Lucia (1996), Saint Vincent & Grenadines (1997), Trinidad & Tobago (1995), US Virgin Islands (1997)
South America: French Guiana (1997), Guyana (1997), Suriname (2001), Venezuela (1999)
Oceania: Australia (Northern Territory, Queensland, South Australia, Western Australia), Guam, Micronesia, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu, Western Samoa
EU: absent
Distribution map: see CABI/EPPO (2004)

Biology

The life cycle of *M. hirsutus* has been studied in India. Each adult female lays 150–600 eggs over a period of about one week, and these hatch in 6–9 days (Bartlett, 1978; Mani, 1989). A generation is completed in about five weeks in warm conditions. In countries with a cool winter, the species survives cold conditions as eggs (Bartlett, 1978) or other stages, both on the host plant and in the soil (Pollard, 1995). There may be as many as 15 generations per year (Pollard, 1995). Small 'crawlers' (0.3 mm long) are readily transported by water, wind or animal agents. Crawlers settle in cracks and crevices, usually on new growth which becomes severely stunted and distorted, in which densely packed colonies develop. There are three immature instars in the female and four in the male. Reproduction is mostly parthenogenetic in Egypt (Hall, 1921) and Bihar (IN) (Singh & Ghosh, 1970), but *M. hirsutus* is bi-parental in West Bengal (IN) (Ghose, 1971b; 1972a) and probably in the Caribbean (Williams, 1996).

Infestations of *M. hirsutus* are often associated with attendant ants (Ghose, 1970; Mani, 1989).

Detection and identification

Symptoms

Infested growing points become stunted and swollen. This varies according to the susceptibility of each host species. In highly susceptible plants, even brief probing of unexpanded leaves causes severe crumpling of the leaves, and heavy infestation can cause defoliation and even death of the plant. As the plant dies back, the mealybugs migrate to healthy tissue, so the colonies migrate from shoot tips to twigs to branches and finally down the trunk. The mealybugs themselves are in general readily visible, though sometimes hidden in the swollen growth.

Morphology

Eggs pink. Crawlers 0.3 mm long, pink; immature females and newly matured females greyish-pink, dusted with mealy white wax; adult female 2.5–4 mm long, soft-bodied, elongate oval and slightly flattened. Entire colony becoming covered by white, waxy ovisac material.

Slide-mounted females show the combination of 9-segmented antennae, anal lobe bars, numerous dorsal oral rim ducts on all parts of the body except the limbs and long, flagellate dorsal setae. This makes the species fairly easy to recognize in parts of the world where other *Maconellicoccus* species do not occur. Males have one pair of very simple wings, long antennae, white wax filaments projecting posteriorly and no mouthparts. See also the EPPO diagnostic protocol for this species (OEPP/EPPO, 2006).

Pathways for movement

M. hirsutus can spread locally by wind dispersal of the crawler stage. However, long-distance movement is most probable on plants for planting of host species. Cut flowers and fruits could possibly also carry the pest, though with less chance of its moving to endangered hosts.

Pest significance

Economic impact

In its native range, *M. hirsutus* has been recorded causing economic damage to many crops. In India, losses have been reported for: cotton (Dhawan *et al*., 1980; Muralidharan & Badaya, 2000); the fibre crops *Hibiscus sabdariffa*, *Hibiscus cannabinus* and *Boehmeria nivea* (Ghose, 1961; 1971a; Singh & Ghosh, 1970; Raju *et al*., 1988); grapevine (Manjunath, 1985); mulberry (Rao *et al*., 1993); pigeonpea (Patel *et al*., 1990); *Zizyphus mauritiana* (Balikai & Bagali, 2000). Presumably, many ornamental woody plants are also affected, but populations and damage may be limited by natural enemies.

In the Caribbean, where *M. hirsutus* has recently become established and biological control is only beginning to be used, damage to crops and environment has been heavy. For example, annual losses in Grenada are estimated at 3.5 million USD before establishment of biological control (François, 1996). Similar losses have been estimated in various other Caribbean islands. Various ornamentals important to the tourist industry have been attacked, and also important forest trees such as *Hibiscus elatus* and *Tectona grandis* (Pollard, 1995; Peters & Watson, 1999; Kairo *et al*., 2000). Affected countries suffered serious loss of trade because other countries would not accept shipments of agricultural produce from them (Peters & Watson, 1999). If the mealybug were to spread across the southern USA, it is estimated that it could cause losses of 750 million USD per year (Moffit, 1999).

Williams (1996) notes that almost all serious damage by *M. hirsutus* has been recorded between 7° and 30° North, where there are reports of seasonal differences in the incidence of the pest.

Control

Plant protection products are of limited effectiveness against *M. hirsutus* because of its habit of hiding in crevices, and the waxy covering of its body (Williams, 1996). In India, most granular insecticides are ineffective against *M. hirsutus* (Mani, 1989); systemic insecticides are only used to control heavy infestations. Inorganic oil emulsion sprays gave good control of *M. hirsutus* on guava. Any insecticide used against *M. hirsutus* should be carefully selected to avoid injury to its natural enemies. IPM using both coccinellid beetle predators and insecticides (dichlorvos and chlorpyrifos) has been achieved on grapevine (Mani, 1989).

Biological control by release of natural enemies has proved very successful. *Cryptolaemus montrouzieri* has been used successfully to reduce large populations of *M. hirsutus* in India (Karnataka) (Mani & Krishnamoorthy, 2001) and the Caribbean (Kairo *et al*., 2000). In Egypt, *C. montrouzieri* was unable to survive the cold of winter in sufficient numbers to be effective, and the main biological control agents used are the parasitoids *Anagyrus kamali* and *Achrysopophagus* sp. (Bartlett, 1978). *A. kamali* has also been introduced into the Caribbean (Pollard, 1995; Garland, 1998; Michaud & Evans, 2000; Kairo *et al*., 2000). The success of the biological control programme in the Caribbean, using *C. montrouzieri* and *A. kamali* can be attributed to their rapid rate of reproduction, and to a public awareness programmes to reduce use of plant protection products (Kairo *et al*., 2000).

Little information is available on host-plant resistance or on methods of cultural control.

Phytosanitary risk

M. hirsutus has attracted worldwide attention by its appearance and rapid spread in the Caribbean. It spread similarly in Africa in the past. It is a highly invasive species, readily carried by plants in international trade. For the EPPO region, it may be noted that *M. hirsutus* has long been present in Egypt and

Lebanon, without any further spread. However, conditions in the whole of the southern Mediterranean area would very probably be suitable for its establishment. If more widely introduced, it would probably cause significant damage to numerous woody amenity plants, and possibly to certain crops (cotton, grapevine). There is also a possibility that it could affect glasshouse crops in more northern countries. However, general control of scales and mealybugs is routine under glasshouse conditions. Its presence in EPPO countries would probably affect export markets, since it is regulated as a quarantine pest by many countries in other continents. Its impact could probably, in due course, be moderated by the introduction of the appropriate biological control agents.

Phytosanitary measures

M. hirsutus was added in 2003 to the EPPO A1 action list, and endangered EPPO member countries are thus recommended to regulate it as a quarantine pest. It is relatively easy to detect by inspection, so the basic requirement is that imported consignments of plants for planting should be free from the pest. In addition, the more endangered countries could require that host plants of *M. hirsutus* imported from countries where the pest occurs should originate in a pest-free area, or in a pest-free place of production (immediate vicinity included).

Acknowledgement

The CABI Crop Protection Compendium was used as a major source of information for this data sheet.

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