How to manage Citrus Mealybug in Greenhouse

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As discussed in the May-June 2011 Issue of Hortfresh Journal, Pg. 20-21, the citrus mealybug, Planococcus citri has recently increased to economically damaging levels in most greenhouse ornamentals both in Ethiopia and Kenya, especially where integrated pest management (IPM) is being practiced. Although the reason/s for this is yet to be known, it is safe to speculate that the easing of pesticide use in greenhouses under IPM could have removed the residual effect of the pesticides that usually provide control of mealybugs.

P. citri is sexually dimorphic, i.e. the sexes have distinct morphological differentiations. Females are apterous (wingless), exhibit reduced morphology but can move from place to place due to their legs, albeit reduced. The females do not change completely and are thus neotenic, i.e. exhibit immature characteristics. On the contrary, males are winged and exhibit complete change of morphology during their lives. They live for a short period and never feed during their ephemeral life time. They live only to fertilize the females. It is virtually impossible to distinguish between male and female at the first instar stage but males develop eyespots in the second instar. Reproduction is primarily by parthenogenesis (fertilization without mating) although most mealybug species can reproduce sexually as well.

Nephus bineavatus

Egg: Pale yellow in color and laid into a woven cottony mass called ovisac (a mass of interwoven cottony sacs) underneath or behind ovipositing female.

Nymph:

First-instar nymph is light yellow and is highly mobile. The female has three nymphal instars followed by the adult while the male has four.

Crawlers and first-instar nymphs of P. citri emerging from ovisacs

Adult:

Adult female is about 3 mm long, covered in a mealy wax secretions, with 18 pairs of lateral filaments which lengthen posteriorly with the anal pair being about a quarter of the body length. Although females can move, they usually remain sedentary once they have settled on a suitable feeding site. There is a medio-dorsal line running from the anterior to the posterior body end, which

Table 1. Developmental and reproductive biology of P. citri on Citrus limons and Citrus reticulata (data from Wakgari & Giliomee, 2003).

Growth medium	Tem. (°C)	Reproductive period (range) in days	Generation time (range) in days	Fecundity range (mean)	Percent Fertility
Butternuts	22	11-12	38-45	118-745 (412)	95.8
Seedling Lemon	22	10-12	39-44	50-406 (164)	95.0
Butternuts	27	10-12	36-42	107-666 (423)	95.3
Seedling Lemon	27	10-12	36-43	90-519 (212	92.5

Adult male P. citri

Adult female P. citri,

makes identification of adult P. citri relatively easy. In reality it is not a line but a thinning of the wax layer mid-dorsally where the body segment appears like a continuous line when viewed dorso-medially.

Adult males are covered with cottony cocoon from second instar on. They are about 1 mm long, fragile, yellowish-brown and have hyaline wings and two white long anal filaments. Because of their ephemeral life style, it is often difficult to see them in large numbers.

Life Cycle

The eggs are deposited in the ovisac and hatch in 4-6 days under controlled laboratory conditions and in 6-10 days under field conditions; each of the three nymphal instars may last about 12 days depending on the prevailing ambient temperature. Oviposition commences in about two weeks after the final moult (the female in this stage is referred to as 'pre-ovipositing' adult). The life cycle from egg to egg (generation time) takes about 38-45 days at 27oC and 36-43 days at 22oC in the laboratory. Under field conditions, this period could extend up to 60 days. Between 90 and 745 eggs are laid per female over the 10-12 days of oviposition period (Table 1). The ovipositing females die shortly after termination of egg-laying. Six to eight mealybug broods or generations can be produced per annum depending on ambient temperatures and prevailing humidity. In greenhouses where ambient temperature and relative humidity are kept at optimum, the number of generations could reach up to nine per year.

With an average realized fecundity of over 400 eggs per female and fertility of about 95%, it is possible to speculate that the population of mealybugs could reach economically threatening level in a short time if targeted control is not taken. It is also possible to surmise that any method that provides less than 98-99% control would not bring the population of mealybugs to less than it was before its application due to their high fecundity and fertility.

Therefore, with pests such as mealybugs whose fecundity and fertility is very high the type of control option that has to be chosen and used must be one with greatest efficacy or one that can provide a sustained control over extended period. For this reason, biological control with various predators and parasitoids is usually practiced in management of mealybug populations. The use of various cultural and chemical control options have also proven effective in different parts of the world (see Wakgari, 2011).

Conclusion

Planococcus citri is not only on the increase in various greenhouse ornamentals across Ethiopia and Kenya alike but is also causing serious economic damage to the sector. Thus it is essential that a practical investigation be made on its biology, associated or co-evolved natural enemy complex, effective control method/s and ecology. As this species is highly poyphagous and easily adapted to various ecological settings, it is essential to check what types of potential host plants are grown around ornamental greenhouses and treat these hosts for P. citri control as well. Since crawlers can be carried over a long distance on wind currents, the use of yellow sticky traps for monitoring would be highly recommended.

References

Wakgari, W.M. 2011. How to manage mealybugs in greenhouse. Hortfresh Journal, May-June 2011 Issue; pp. 20-21.

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