MONITORING PARASITES OF THE OAK LECANIUM SCALE WITH YELLOW STICKY TRAPS

by Peter B. Schultz

Abstract. Yellow sticky traps have been found to be an effective method of monitoring the levels of oak lecanium parasites in the tree canopy. Five species of parasites of oak lecanium, a major soft scale pest of oak trees in eastern Virginia, were identified: *Coccophagus lycimnia. Eunotus lividus, Encyrtus fuscus, Blastothrix* sp. and *Pachyneuron altiscutum.* Since peak levels of parasites were found shortly after oak lecanium egg hatch in early June, it is recommended that insecticide sprays for control of oak lecanium be delayed until mid-June to minimize damage to these natural enemies.

The care of shade trees comprises a significant portion of the expenditures in municipal landscapes. An important aspect of this maintenance is the control of pest populations. The oak lecanium, *Parthenolecanium quercifex,* is a major soft scale pest of oak trees in eastern Virginia (Fig. 1). High populations severely reduce vitality, weaken the tree and cause branch or crown dieback (2). Heavy amounts of honeydew are excreted resulting in sooty mold formation on the foliage and beneath infested trees. In Virginia, the female begins oviposition in early May and hatching commences in late May. The first instars (crawlers) feed on the underside of the foliage until late summer, molt, and the second instars return to twigs to overwinter and complete development the following spring (9). Beneficial insects can be observed in most infestations (4). The identity of the Hymenoptera in eastern Virginia and their effectiveness as biological control agents has been reported previously (7). Prior sampling through collection of twig samples has led to identification of five species: *Encyrtus fuscus* and *Blastothrix* sp. (Encyrtidae), internal parasites of the adult female; *Coccophagus lycimnia* (Aphelinidae), an internal parasite of the immature stages; *Eunotus lividus* (Pteromalidae), an egg predator; and *Pachyneuron altiscutum* (Pteromalidae), a secondary parasite (Fig. 2). Weseloh (8) observed that sticky traps are useful for comparing relative population densities of the same species in space and time. They are also useful for sampling and relating the activities of several species and in investigating field behavior and population densities of parasites. The response of insects to variously colored sticky traps has been studied with a variety of insects including leafhoppers, sugarbeet insects, apple maggot adults and gypsy moth parasites (1, 3, 5, 8). This study reports on the monitoring of natural enemies in the tree canopy with sticky traps and its application in making decisions regarding pesticide usage.

Materials and Methods

Four willow oaks, *Quercus phellos,* 5 m high located on a university campus in Norfolk, Virginia were selected for this study. The trees were heavily invested with oak lecanium and had no history of insecticide application. A yellow sticky stake (Fig. 3), 540 cm^2 on one side, (Almac Plastics, Baltimore, MD) was hung in each tree canopy 2m above the ground. The natural enemies in the canopy were monitored by counting the pertinent species trapped on 1 side of each stake. The stakes were cleaned with hot water and detergent and replaced weekly from April to July, 1983 and 1984.

Figure 1. Oak lecanium scale infestation on willow oak, Virginia Beach, Va. — 1984.

Figure 2. Oak lecanium scale parasites: (left to right) *Encyrtus fuscus, Blastothrix* sp., *Eunotus lividus, Pachyneuron altiscutum* and *Coccophagus lycimnia.*

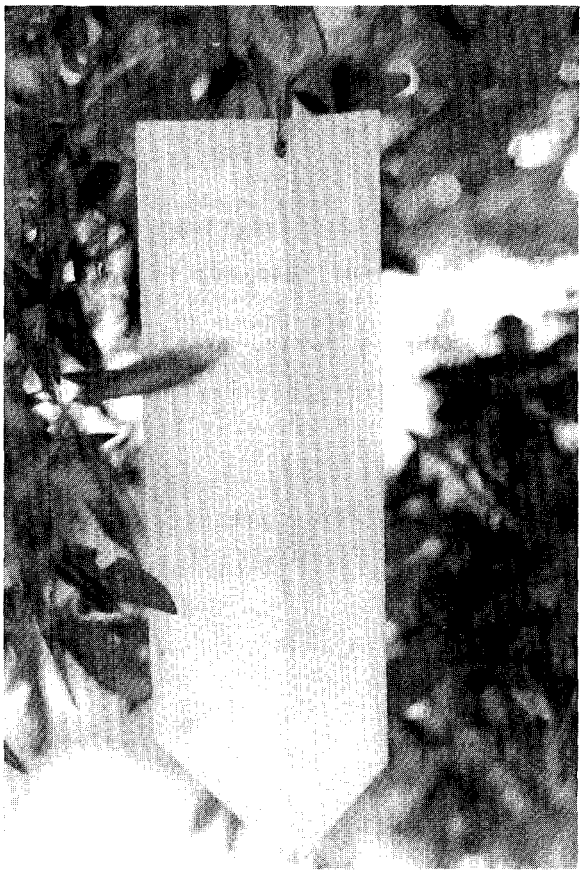

Figure 3. Yellow sticky stake in oak tree canopy.

Results and Discussion

Trapping within the tree canopy in both 1983 and 1984 corresponded to the life stages of oak lecanium known to be attacked by each parasite species. *Coccophagus lycimnia* was one of two species collected on sampling dates in late April and early May (Figs. 4 and 5). This was expected since this species parasitizes immature stages. *Eunotus lividus* overwinters beneath female oak lecanium scale covers that had hatched the previous spring. Trapping of this species in early May coincided with the oviposition period of oak lecanium. A larger peak of *E. lividus* in early June followed the completion of its spring generation. *Encyrtus fuscus* and *Blastothrix* sp., internal parasites of the female, were both abundant in late May and early June. *Pachyneuron altiscutum,* a secondary parasite of *E. lividus,* had a trapping pattern very similar to its host, but peaked slightly later than *E. lividus.*

The use of insecticides against oak lecanium is normally based on level of infestation and extent of honeydew excretion beneath the tree. Insec-

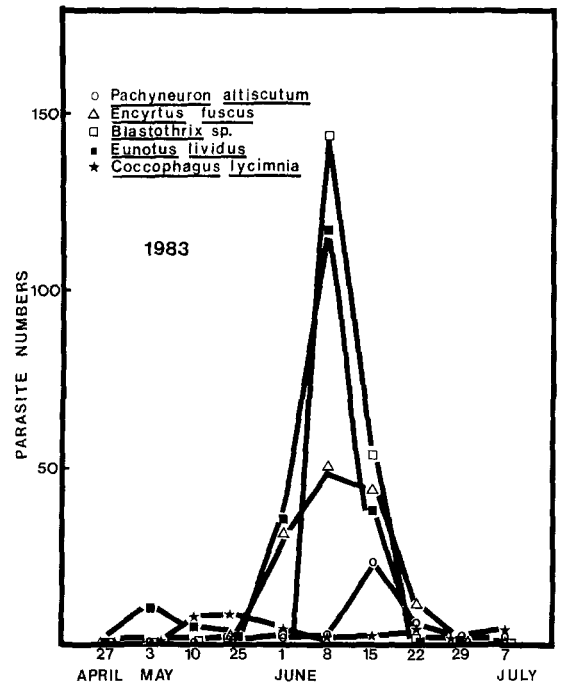

Figure 4. Means of weekly oak lecanium parasite collections from willow oak tree canopy — 1983.

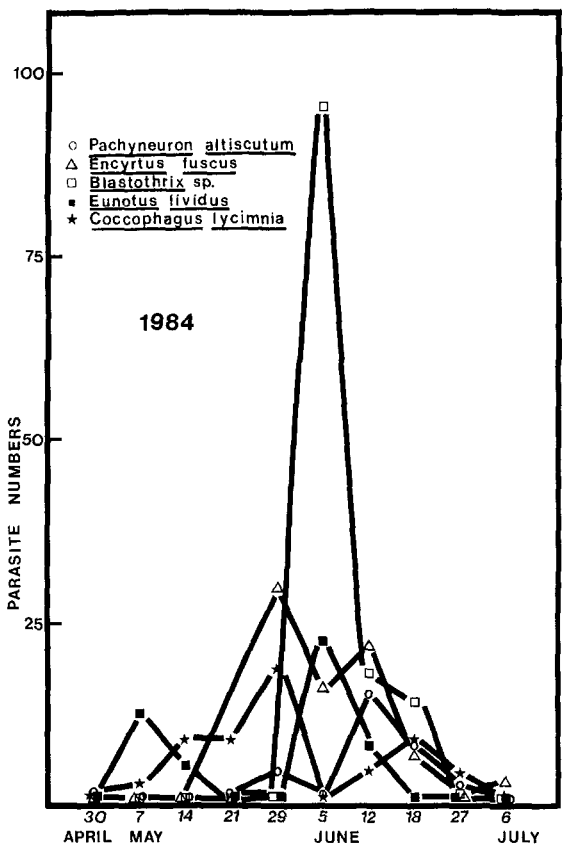

Figure 5. Means of weekly oak lecanium parasite collections from willow oak tree canopy — 1984.

ticides for control of oak lecanium are commonly applied in early June after egg hatch. These data indicate that the natural enemies are at their peak levels in the tree canopy at that time. The effect of the insecticides on the natural enemies could be minimized by delaying spray applications until June 15-30. Previous studies comparing insecticides for control of oak lecanium have shown that pesticides can be applied with success during this period (6). While cumulative parasitism ranged from 10 to 60% in previous studies (7), further research is needed to quantify the effects of each parasite on reducing oak lecanium levels. This study shows the importance of monitoring natural enemies of a shade tree pest in the tree canopy and how the data can be applied for the cumulative benefits of biological control, and, if needed, chemical control.

Literature Cited

1. Alverson, D.R., J.N. All and R.W. Mathews. 1977. *Response of leafhoppers and aphids to variously colored sticky traps.* J. Ga. Entomol. Soc. 12: 337-341.
2. Baker, W.L. 1972. Eastern Forest Insects. U.S.D.A. Misc. Publ. 1175.
3. Capinera, J.L. and M.R. Walmsley. 1978. *Visual responses of some sugarbeet insects to sticky traps and water pan traps of various colors.* J. Econ. Entomol. 71: 926-927.
4. Johnson, W.T. and H.H. Lyon. 1976. Insects That Feed on Trees and Shrubs. Cornell Univ. Press, Ithaca, NY.
5. Maxwell, C.W. 1968. *Interception of apple maggot adults on colored traps in an orchard.* J. Econ. Entomol. 61: 1259-1260.
6. Schultz, P.B. 1983. *Evaluation of selected insecticides for control of oak lecanium.* Proc. South. Nurs. Assoc. Res. Conf. 28th Ann. Rpt. p. 143.
7. Schultz, P.B. 1984. *Natural enemies of oak lecanium (Homoptera: Coccidae) in eastern Virginia.* Environ. Entomol. (in press).
8. Weseloh, R.M. 1981. *Relationship between colored sticky panel catches and reproductive behavior of forest tachinid parasites.* Environ. Entomol. 10: 131-135.
9. Williams, M.L. and M. Kosztarab. 1972. *Morphology and systematics of the Coccidae of Virginia with notes on their biology.* Va. Polytech. Inst. and State Univ. Bull. 74, Blacksburg.

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