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UNSUCCESSFUL SEARCH FOR PARASITES OF THE CRAPEMYRTLE APHID, *TINOCALLIS KAHAWALUOKALANI* (HOMOPTERA: APHIDIDAE)

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Crape myrtle, *Lagerstroemia indica* L., (Lythraceae) is one of the most important ornamental plants in the southeastern U.S. Its beautiful summer flowers, fall foliage color, unique bark and growth habits and general utility make it an excellent landscape plant (Egolf & Andrick 1978). Crape myrtle is an exotic species introduced from southeast Asia to Africa, Australia, Europe, North and South America. In the U.S., crape myrtle is attacked by only a few foliar pests of economic significance: a host-specific powdery mildew, *Erysiphe lagerstroemiae* E. West, the Japanese beetle, *Popilia japonica* Newman in the upper Southeast and Northeast, a flea beetle, *Altica* sp., and the host-specific crapemyrtle aphid (CMA), *Tinocallis kahawaluokalani* (Kirkaldy). Other insects commonly observed in Florida on crape myrtle include planthoppers and leafhoppers, most notably the glassy-winged sharpshooter, *Homalodisca coagulata* (Say), and occasionally other aphid species, although these insects are of little consequence as pests of crape myrtle.

CMA commonly occurs with *L. indica* and has been reported from North America (Richards 1967, Smith & Parron 1978), Hawaii (Zimmerman 1948), Thailand (Banziger & Hengsawad 1985), China, Taiwan, Japan (Zimmerman 1948, Richards 1967) and India (Agarwala et al. 1989). Additionally, the senior author has observed CMA in Cameroon, Malaysia, Mexico and the Philippines (Mizell, unpublished). While CMA is ostensibly host-specific to *L. indica* in North America, Agarwala et al. (1989) reported CMA as infesting *Lawsonia alba* L. another member of the Lythraceae in India.

CMA reproduces rapidly (Alverson & Allen 1991) and populations can reach very high numbers (>100/leaf on susceptible cultivars, Mizell & Knox 1993). CMA produces copious amounts of honeydew which serve as a substrate for sooty mold. Sooty mold turns the leaves and bark black and unsightly. Therefore, CMA is controlled with pesticides in the nursery and landscape despite recommendations to conserve the aphids for their value to enhance biological control in neighboring crops (Mizell & Schiffhauer 1987, Mizell & Knox 1995). CMA can be very important in sustaining generalist predator populations as many beneficial arthropods also feed on the aphid's honeydew (Mizell & Schiffhauer 1987).

Although many native and introduced generalist predators prey upon CMA in the U.S., they are unable to control it with one exception. The exotic multicolored Asian ladybird, *Harmonia axyridis* Pallas, has colonized Florida and most of the U.S. (Chapin & Brou 1991, Tangley 1999) and is capable of eliminating CMA populations on individual crape myrtle plants (Mizell, unpublished). Although Alverson & Allen (1992) reported emergence of a parasite, *Lysiphlebus testaceipes* (Cresson), from CMA mummies in a greenhouse, no other parasites have been reported from CMA in the U.S or the world.

We completed several collecting trips in Southeast Asia, the native habitat of *L. indica*, and searched for CMA natural enemies in other areas we visited from 1988-2000. Our objectives were to locate candidate parasites, import them to the U.S. in quarantine, evaluate and release them in the field. Collection sites varied from urban street plantings, parks and temple gardens to rural roadsides and farms. We found large populations of CMA everywhere crape myrtle occurred along with numerous species of Chrysopidae, Coccinellidae, Miridae and other generalist predators. However, no parasites were ever found. Because it is unusual for a foliar-feeding aphid to be free of hymenopterous parasites, we present here the areas searched to date (Table 1).

Why CMA is not parasitized by Hymenoptera is open to speculation. Several scenarios are possible: (1) Parasites may occur but have not been found; (2) The aphid may be able to defend itself by encapsulation or with chemical toxins; and (3) CMA may not have parasites.

L. indica, other species of the genus *Lagerstroemia, L. parviflora* Roxburgh, *L. speciosa* (L.) and the plant family Lythraceae have been reported to contain alkaloids in the leaves, stems and seeds. Six alkaloids were isolated from *L. indica* seed pods. Trace amounts were also found in the stems and leaves. Three of the *L. indica* alkaloids, lagerstroemine, lagerine and dihydroverticillatine were unique while three others, decamine, decinine and docodine, were also found in *Decodon verticillatus* (L.) (Lythraceae) (Ferris et al. 1971a,b, Barik & Kundu 1988, Jehan et al. 1990). Moreover, we have observed adults of some species of Chrysopidae and Coccinellidae feeding on

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TABLE 1. COUNTRIES AND APPROXIMATE LOCATIONS WHERE CRAPE MYRTLE, *LAGERSTROEMIA INDICA* L., AND CRAPE-MYRTLE APHID, *TINOCALLIS KAHAWALUOKALANI* (KIRKALDY), WERE FOUND WITHOUT PARASITES.

Country	City
Cameroon	Douala and Chang
Jamaica	Ocho Rios
Malaysia	Kuala Lumpur and surrounding areas within 100 miles
Mexico	Cancun
People's Republic of China	Beijing, Chengdu, Changsha, Fuzhou, Chongqing, and Guangzhou (Foshan City), Xian, Guilin, Hong Kong
Philippines	Manilla, Los Banos and surrounding areas within 50 miles.
Puerto Rico	San Juan
Thailand	Bangkok and surrounding area within 50 miles
United States	Most states in the Southeast

CMA but have not found immatures of these species feeding on CMA (Mizell, unpublished 1999, Mizell & Schiffhauer 1987). Therefore, a speculation is that CMA could use *L. indica* chemicals for defense as has been reported for other aphids (Jones & Klocke 1987, Malcolm 1990).

Another possibility is encapsulation of parasite eggs or larvae as an aphid physiological response to foreign objects which is well known (Hagen & van den Bosch 1968, Carver & Sullivan 1988, Tardieux & Rabasse 1988).

We believe that the single observation of CMA parasitism by Alverson & Allen (1992) may be best explained as an opportunistic and unusual association. *L. testaceipes* has a broad host range and attacks many species of aphids on plants from many families. The oleander aphid, *Aphis nerii* Boyer de Fonscolombe, feeds on oleander, *Nerium oleander* L. Oleander also contains alkaloids. However, *A. nerii* is successfully parasitized by *Lysiphlebus testaceipes* (Cresson) (Stary et al. 1988b). Moreover, *L. testaceipes* is capable of expanding its aphid host range rapidly (Stary et al. 1988a). However, we have not observed it attacking CMA in the field.

SUMMARY

Extensive searches for parasitic Hymenoptera of the crape myrtle aphid, *Tinocallis kahawaluokalani* (Kirkaldy), on several continents have failed. A parasite-free condition is an unusual occurrence among the foliar-feeding Aphididae. Such an extensive search has been conducted for only a small percentage of aphid species of economic importance, thus, the frequency of occurrence and the underlying determinants of the phenomenon remain to be determined.

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