

Metallic Flea Beetle Feeding Preferences on Crape Myrtle[®]

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Flea beetles in the genus *Altica* (Coleoptera: Chrysomelidae) are primarily a problem on crape myrtle in the nursery and not of established landscape plantings. The few published accounts of this beetle (Mizell and Knox, 1993; Byers, 1997) mention the beetle as a pest in the South. Flea beetles can cause sudden, unpredictable, and dramatic defoliation of new growth during commercial production in a region from Oklahoma to Virginia and south to the Gulf Coast.

Many flea beetle species feed on plants in only one or two families. The adult flea beetle is believed to migrate from wild herbaceous hosts in the Onagraceae and Lythraceae families. Several weed species that may grow in or around crape myrtle production nurseries can harbor flea beetles (e.g., primroses (*Oenothera* sp. and *Ludwigia* sp.)) (Schultz et al., 2001; Pettis et al., 2004).

Female flea beetles lay their small yellow-orange eggs on the lower surfaces of the leaves of wild hosts. The larvae hatch and feed on leaf tissue during early development, then drop or crawl to the ground where they bury themselves in the soil or leaf litter and pupate. They emerge as adults within a few weeks and have two to three generations per year in many area of the South (LeSage, 1995).

Observations of crape myrtles showing no damage next to severely damaged cultivars of crape myrtles after a flea beetle outbreak led us to conclude that some crape myrtles cultivars are resistant to flea beetles. Our objective was to determine which cultivars were susceptible and which ones were resistant to flea beetle feeding damage.

MATERIALS AND METHODS

Flea Beetle Choice Trials. Crape myrtle cultivars from three nurseries were evaluated after each nursery had flea beetle outbreak. Ratings were taken from three terminal branches of ten randomly selected trees from all available crape myrtle cultivars at two Mississippi nurseries specializing in container grown plants (3, 7, and 25 gal), and from one terminal branch of ten randomly selected liners at a nursery in Alabama. The rating scale was from 1 to 5 with the following criteria: 1 = no damage, 2 = 1%–25% of the leaves damaged, 3 = 26%–50% of the leaves damaged, 4 = 51%–75% of the leaves damaged, and 5 = 76%–100% of the leaves damaged (Holcomb, 1997). Data for each container size were analyzed separately.

Flea Beetle No-choice Trials. A laboratory study was conducted by subjecting leaves of 22 available crape myrtle cultivars to flea beetles in a Petri dish. The experiment was used to verify the choice tests. See Pettis et al. (2004) for details of the experiment.

RESULTS

Table 1 lists crape myrtle cultivars as resistant or susceptible to flea beetle damage based on this study and studies published in Pettis et al. (2004) and Cabrera et al. (2003).

Flea Beetle Choice Trials. Ten cultivars were available in 25-gal containers. 'Biloxi', 'Muskogee', 'Natchez', 'Sarah's Favorite', 'Tonto', and 'Tuscarora' had damage ratings at or near one. Four cultivars had significantly more damage than the other six: 'Country Red', 'Dynamite[®]', 'Red Rocket[®]', and 'Sioux'.

'Biloxi' had an average damage rating of 3.8 which was higher than the remaining taxa that had an average damage rating near 1: 'Miami', 'Natchez', 'Tonto', and 'Tuscarora' in the 7-gal containers. Three cultivars received a significantly higher damage rating than the other five cultivars available: 'Carolina Beauty', 'Dynamite[®]', and 'Twilight'.

'Biloxi', 'Chickasaw', 'Miami', 'Natchez', 'Tonto', 'Tuscarora', and 'Yuma' had average damage ratings at or below 1.5 in the 3-gal containers. 'Carolina Beauty' and 'Dynamite[®]' had an average damage rating greater than 4. 'Twilight' had the highest damage rating (4.97) of the 12 cultivars and was significantly higher than all others except 'Okmulgee' and 'Pocomoke' (4.80 and 4.63, respectively).

Those taxa with the lowest average damage ratings in liners were 'Apalachee', 'Chickasaw', 'Miami', 'Natchez', 'Pecos', 'Pocomoke', 'Tonto', and 'Wichita'. Three cultivars ('Comanche', 'Tightwad Red[®]', and 'Yuma') received average damage ratings significantly different from the highest and lowest ratings. The following nine cultivars in liners had the highest damage ratings: 'Catawba', 'Centennial', 'Centennial Spirit', 'Hope', 'Hopi', 'Raspberry Sundae[®]', 'Red Rocket[®]', 'Velma's Royal Delight', and 'Zuni'.

Flea Beetle No-choice Trials. Significant differences were detected among the cultivars in the Petri dish evaluations. Three cultivars had no observed feeding damage: 'Acoma', 'Muskogee', and 'Tonto'. Six other cultivars showed slight feeding, but were not significantly different than those with no feeding: 'Apalachee', 'Fantasy', 'Miami', 'Natchez', 'Osage', and 'Sarah's Favorite'. 'Seminole', and 'Pink Ruffles' had the highest feeding damage percentage, and 11 other taxa were not significantly different from them: 'Arapaho', 'Biloxi', 'Carolina Beauty', 'Cheyenne', 'Country Red', 'Dynamite[®]', *L. limii*, 'Low Flame', 'Pecos', 'Red Rocket[®]', and 'Sioux'.

DISCUSSION

From the results of the choice and no-choice trials those cultivars resistant to flea beetle damage are 'Acoma', 'Apalachee', 'Natchez', 'Osage', 'Tonto', 'Tuscarora', and 'Wichita'. The cultivars most susceptible to damage are 'Carolina Beauty', 'Country Red', 'Centennial Spirit', 'Dynamite[®]', and 'Hopi'.

Resistance of crape myrtles to flea beetles' feeding follows a general trend based on parentage of the crape myrtle cultivars (Table 2). Among each nursery rating those crape myrtle cultivars with *L. fauriei* in their parentage typically had little or no flea beetle damage. Notable exceptions to this trend are 'Sioux' in the 25-gal containers, 'Biloxi' in the 7-gal containers, 'Pocomoke' in the 3-gal containers, and liners of 'Comanche', 'Hopi', 'Pocomoke', 'Yuma', and 'Zuni'.

The general trend found in the nursery ratings was supported by the no-choice study. Those cultivars lacking *L. fauriei* in their parentage exhibited the highest percent damage per beetle. Several cultivars, each with *L. fauriei* in their parentage, had little to no apparent damage ('Acoma', 'Muskogee', 'Natchez', 'Sarah's Favorite', and 'Tonto'). Other cultivars with *L. fauriei* in their parentage were not significantly different from the above-undamaged cultivars.

Cultivars released by the National Arboretum resulted from complex crosses of *L. indica* and *L. fauriei* (Pooler, 2003), which were selected for powdery mildew resistance in combination with horticultural traits such as growth habit and floral display. Arthropod susceptibility was not a factor in the selection process of these cultivars; therefore they should vary in their susceptibility to feeding if feeding resistance is not linked to powdery mildew resistance. Observations reported in this

Table 1. Crape myrtle cultivars resistant or susceptible to flea beetle damage compiled from this study, Pettis et al. (2004), and Cabrera et al. (2003).

Cultivar	<i>Lagerstroemia faurei</i> parentage	Flea beetle resistance
Acoma	Yes	Resistant
Apalachee	Yes	Moderately resistant
Arapaho	Yes	Moderately resistant
Basham's Party Pink	Yes	Resistant
Biloxi	Yes	Moderately susceptible
Byers' Red Standard	No	Moderately susceptible
Byers' Wonderful White	No	Moderately susceptible
Carolina Beauty	No	Moderately susceptible
Catawba	No	Susceptible
Cedar Lane Red	No	Moderately susceptible
Centennial	No	Moderately susceptible
Centennial Spirit	No	Moderately susceptible
Cheyenne	Yes	Moderately resistant
Chickasaw	Yes	Moderately resistant
Choctaw	Yes	Moderately susceptible
Comanche	Yes	Moderately susceptible
Country Red	No	Moderately susceptible
Dallas Red	No	Susceptible
Dynamite	No	Susceptible
Fantasy	Yes	Resistant
Hardy Lavender	No	Moderately susceptible
Hope	No	Moderately susceptible
Hopi	Yes	Susceptible
Kiowa	Yes	Resistant
Lipan	Yes	Resistant
Low Fame	No	Moderately susceptible
Miami	Yes	Moderately resistant
Muskogee	Yes	Resistant
Natchez	Yes	Resistant
Okmulgee	No	Moderately susceptible
Osage	Yes	Resistant
Ozark Springs	No	Moderately susceptible
Pecos	Yes	Moderately susceptible
Pink Ruffles	No	Moderately susceptible
Pink Velour	No	Moderately susceptible
Pocomoke	Yes	Moderately resistant
Potomac	No	Moderately susceptible
Powhatan	No	Moderately susceptible
Raspberry Sundae	No	Moderately susceptible
Red Rocket	No	Moderately susceptible
Regal Red	No	Moderately susceptible
Sarah's Favorite	Yes	Moderately resistant
Seminole	No	Moderately susceptible
Sioux	Yes	Moderately susceptible

Cultivar	<i>Lagerstroemia faurei</i> parentage	Flea beetle resistance
Tightwad	No	Susceptible
Tonto	Yes	Resistant
Townhouse	Yes	Resistant
Tuscarora	Yes	Resistant
Tuskegee	Yes	Moderately resistant
Twilight	No	Moderately susceptible
Velma's Royal	No	Moderately susceptible
Victor	No	Moderately susceptible
Wichita	Yes	Moderately resistant
William Toovey	No	Moderately susceptible
Yuma	Yes	Moderately resistant
Zuni	Yes	Moderately susceptible

study and other similar studies (Cabrera et al., 2003; Pettis et al., 2004) indicate that the genetic diversity within *L. fauriei* and other *Lagerstroemia* species should be evaluated thoroughly to establish and define sources of resistance to insect feeding.

Integrated pest management practices should be implemented for control of flea beetle outbreaks in production nurseries. Scouting at regular intervals for presence of beetles should focus on new growth flushes of pure *L. indica* cultivars, such as 'Carolina Beauty', 'Country Red', Dynamite®, Red Rocket® 'Twilight', and 'Regal Red'. Cultivars which had little or no damage in the trials conducted (e.g., 'Natchez', 'Muskogee', and 'Acoma') will require minimal and will likely require no pesticide application for these beetles. However, those cultivars that are susceptible will probably need treatment to control infestations, so the susceptible and resistant cultivars should be grown separately.

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