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Evaluation of Selected *Cotoneaster* spp. for Resistance to Hawthorn Lace Bug¹

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Abstract

Four *Cotoneaster* species were evaluated for resistance to hawthorn lace bug. In a preference study using adults, the lace bugs preferred *C. x watereri* Exell. 'Brandekeir' when compared to the other 3 species, *C. lacteus* W.W.Sm., *C. nitens* Rehd. & E.H. Wils. and *C. acutifolius* Turcz. Significantly fewer nymphs completed development on foliage of *C. lacteus* than on *C. x watereri* 'Brandekeir,' *C. nitens* and *C. acutifolius*. The presence of dense pubescence is suggested as a factor in this reduced development.

Index words: Cotoneaster, hawthorn lace bug, insect resistance

Introduction

The hawthorn lace bug, *Corythucha cydoniae* (Fitch), selectively attacks plants in the Rosaceae, causing injury to the foliage. Damage results from mechanical removal of chlorophyll. Initial injury consists of small, chlorotic areas which may expand with continued feeding and cover the entire leaf surface. Both native and cultivated species of *Amelanchier* and *Crateagus* and ornamental cultivars of *Cotoneaster* and *Pyracantha* commonly serve as hosts (5).

Differences in susceptibility to feeding injury caused by hawthorn lace bug were observed in 1980. Evaluation of feeding preference on *Cotoneaster* and *Pyracantha* commonly planted in eastern Virginia was conducted in 1981-82 (3). The results indicated significant differences in preference between species/cultivars of both *Pyracantha* and *Cotoneaster*. Four additional *Cotoneaster* species with similar growth habits and hardiness were acquired from several arboreta and evaluated for resistance to the hawthorn lace bug.

Materials and Methods

Adult Feeding Preference. Single terminal cuttings approximately 15 cm (6 in) long of *Cotoneaster lacteus* W.W.Sm., *Cotoneaster acutifolius*, Turcz., *Cotoneaster nitens* Rehd & E.H. Wils. and *Cotoneaster x watereri* Exell. 'Brandekeir' were collected and immediately placed together and supported in a 50 ml (1.6 fl oz) flask filled with water. Each flask was placed in a screen-covered, 4 l (1 gal) jar in the laboratory, maintained at 27°C (80°F) and 16 hr photoperiod. Adult lace bugs were field collected from foundation plantings of *Crateagus phaenopyrum* (L.f.) Medic. with a shake cloth and transferred to vials with an aspirator. Thirty adults were introduced into each jar. The number of hawthorn lace bugs settled on each cultivar were

counted 24 hr after introduction. Cuttings were evaluated on 5 dates from July to August 1983 and on 4 dates from June to September 1984; four replications on each date.

Nymphal Development Study. Foliage of host plants with evidence of recent lace bug oviposition was collected and placed in water-filled vases for daily examination. Newly hatched nymphs were carefully removed each day and placed on terminal cuttings of *Cotoneaster* species under evaluation. Single cuttings were placed in a water-filled vase covered with a tight-fitting cage. Five nymphs were introduced on each cutting. The cages were placed in an environmental chamber at 27°C (80°F) and a 16 hr photoperiod with 10 replicates of each *Cotoneaster* species. The cages were checked daily to observe nymphal development. The number of lace bugs completing development and developmental time period were determined.

Results and Discussion

Adult Feeding Preference. During both years of the study, adult hawthorn lace bugs exhibited a preference for *C. watereri* 'Brandekeir' (Table 1). The numbers of lace bugs on *C. watereri* 'Brandekeir' were significantly greater than on the other *Cotoneaster* species tested in 1983. In 1984, lace bug numbers on *C. watereri* 'Bran-

Table 1. Mean number of adult hawthorn lace bugs on 4 *Cotoneaster* species.²

Species	1983	1984
<i>C. lacteus</i>	4.5 a	3.5 a
<i>C. acutifolius</i>	3.6 a	5.9 bc
<i>C. nitens</i>	4.3 a	4.9 ab
<i>C. watereri</i> 'Brandekeir'	7.1 b	7.6 c

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²Means within columns followed by the same letter are not significantly different according to the Duncan's multiple range test, $p=0.05$.

Table 2. Comparison of nymphal development and development period with 4 species of *Cotoneaster*.²

Species	Nymphal Survival	Nymphal Period
<i>C. lacteus</i>	0.67 a	12.5 ± 2.1 b
<i>C. acutifolius</i>	20.7 b	11.5 ± 1.1 b
<i>C. nitens</i>	20.0 b	10.5 ± 1.1 a
<i>C. watereri</i> 'Brandekeir'	12.0 b	11.1 ± 1.2 b

²Nymphal survival, number of adults per 50 one-day-old nymphs introduced. Nymphal period, number of days for nymphal development from first instar to adult. Means within columns followed by the same letter are not significantly different according to the Duncan's multiple range test, $p = 0.05$.

dekeir' were significantly higher than on 2 of the other 3 species tested. *C. lacteus* supported the lowest population of lace bugs in 1984, with significantly greater numbers recorded on *C. acutifolius* and *C. watereri* 'Brandekeir.'

Nymphal Development Study. Fewer lace bug nymphs completed development on *C. lacteus* than on the other *Cotoneaster* species (Table 2). Development time for lace bugs on all *Cotoneaster* species ranged from 10.5-12.5 days. Longest development time occurred on *C. lacteus* which could indicate poor host suitability (Table 2).

Adult feeding preference studies indicated *C. lacteus* was not preferred and was significantly lower than *C. watereri* 'Brandekeir' in both 1983 and 1984. The low numbers of hawthorn lace bug nymphs completing development on *C. lacteus* suggests host-plant resistance exists in this species. A possible factor is the dense pubescence on the underside of its leaves. It contrasts with the other species evaluated that are either glabrous or with slightly pubescent young foliage that becomes glabrous (1). Pubescence has been shown to interfere

with feeding, digestion and oviposition as well as providing a mechanical barrier to locomotion and attachment (4). Recent literature of the relationship between plant hairs and insects indicates that plant hairs confer some insect resistance in 39 of 50 cases (4). The mechanical effects of the pubescence depend on the characteristics of the trichomes: density, erectness, length and shape. Small insects with piercing-sucking mouthparts such as lace bugs, may be deterred from feeding on foliage with dense pubescence if the tip of the proboscis cannot reach the mesophyll (2).

Significance to the Nursery Industry

The results of this study indicate that *Cotoneaster lacteus* would be preferred for planting over the other species evaluated because of its resistance to hawthorn lace bug. Resistance may be associated with pubescence on the underside of leaves. Identification and use of resistant species and cultivars in an urban planting is an important component of integrated pest management. Further study will evaluate *Cotoneaster* species with different horticultural characteristics for evidence of host plant resistance.

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