Viburnum Leaf Beetle Citizen Science Project

The inaugural year of the *Viburnum Leaf Beetle Citizen Science* project was a rousing success. I am thrilled with the level of involvement in 2003. I have summarized the major findings resulting from the project below, and have added some new information we learned in my laboratory during this past year. I hope to see you continue your participation in the project this coming year.

Remember the most effective means of controlling viburnum leaf beetle is pruning and destroying twigs infested with egg-laying sites any time from October through early May, or spraying a chemical pesticide when larvae first appear in early May (consult your local extension office for legal pesticides for this pest in your area). A soil application of a systemic insecticide such as Merit 75WP can also be highly effective (but be aware that time is required for systemic insecticides to be taken up from the soil by plants). Spraying adults alone is the least successful management strategy.

Documenting the spread of viburnum leaf beetle

Citizen Scientists reporting evidence of viburnum leaf beetle came from counties in six states and two provinces. All of the infestations were in counties previously known to be infested with viburnum leaf beetles, except for possibly one new county in Pennsylvania (this is being verified). Cornell county extension educators reported the new existence of viburnum leaf beetle in Albany and Rensselaer Counties in New York State in 2003. These infestations did not result from natural spread of the beetle, but rather from the transportation of infested nursery stock to the new area from previously infested regions.

Susceptibility of *Viburnum* species

The susceptibility of various species of *Viburnum* to viburnum leaf beetle as reported by Citizen Scientists followed pretty closely with what we had seen in the field and read in the literature (see Table 1). The species that have been classified as *Most susceptible* and *Resistant* were found by participants to suffer the greatest and least damage, respectively. Although *V. pragense* and *V. prunifolium*, which we had classified as moderately susceptible, showed no signs of infestation by citizen scientists, only one specimen of each species was monitored (we call this a small sample size!).

We have tentatively added three species to our susceptibility table based on observations reported through the *Citizen Science* project: *V. carlcephalum* and *V. macrocephalum* in the moderately susceptible category, and *V. lantanoides/alnifolium* in the resistant category. Let's keep our eyes open for other representatives of these species to confirm these findings.

Patterns of larval infestation

The only species for which extensive observations were reported were *V. dentatum* and *V. opulus/trilobum*, so 2003 conclusions will be drawn from data reported for those two species. Surprisingly, slightly different patterns of infestation were observed on *V. dentatum* and *V. opulus/trilobum*. Whereas the greatest number of larvae and the highest damage was reported on the lower to middle portions of *V. dentatum*, larval numbers and damage tended to be highest in the middle to upper portions of *V. opulus/trilobum.* One possible explanation is that the *V. opulus/trilobum* specimens might have been in more heavily shaded locations

than *V. dentatum*. If this were the case, there would be less difference in light intensity between the upper and lower portions of the plant, and less preference of adults for one of these sections over the other.

In previous observations, we have noticed that larvae tend to be found less often in the sunnier regions of plants and more often in the shaded (lower) portion. I interpret this to mean that adults either prefer to spend time (and lay eggs) in the shade, or find it easier to lay eggs on shaded branches (perhaps because plant tissues are more tender when not exposed to intense sunlight). This effect should be most pronounced for plants in full sun, where there is a strong contrast between the sun-exposed, upper portion of the plant and the shaded, lower portion of the plant. For plants in the shade, there should be less difference between the upper and lower branches of a given shrub, which should result in a smaller differential in larval density and feeding rating between the upper and lower parts of the shrub. This bears further investigation.

Larval density and plant damage

As expected, plant damage increased in relation to larval density, but this relationship varied between *V. dentatum* and *V. opulus/trilobum*. The relationship was quite straightforward and predictable in the case of *V. opulus/trilobum*; the percent defoliation increased sharply with increased larval density, with defoliation plateauing at 100% above an initial larval density of 4 per leaf. This means that leaves with 4 or more larvae (observed in early to mid May) showed 100% defoliation by the end of the larval feeding period.

The situation with *V. dentatum* was a bit unusual, but even more dramatic. In this case, 100% defoliation was observed even when only a single larva was found on leaves of *V. dentatum* in early to mid May! I suspect this is because small larvae are harder to spot on leaves of *V. dentatum* (they can easily hide between the leaf veins of *V. dentatum* on the undersides of leaves, especially when leaves are not fully expanded). Thus, leaves for which only one larva was reported likely had more larvae that simply were not seen.

In any event, these data indicate that even when relatively few larvae are seen on the foliage of susceptible plants in mid May, extensive defoliation may result. These results are preliminary because the sample size was not particularly large, and additional data are required before firm conclusions can be drawn.

Biological control of viburnum leaf beetle

One of the research projects in my laboratory is aimed at determining if predaceous insects or nematodes can be effective control agents of viburnum leaf beetle. So far, we have found that several species of lady beetles (in both larval and adult stages), lacewing larvae, and nematodes can cause significant mortality of viburnum leaf beetle larvae in controlled settings (a necessary first step in this type of research). We also found a species of predaceous stink bug feeding on both larvae and adults of viburnum leaf beetle. We will be evaluating these natural enemies in field settings soon to determine if they can control viburnum leaf beetle in real life settings.

We have also been evaluating biopesticides against larvae of viburnum leaf beetle. These products contain pathogens or microbial toxins that have very specific activity against pest insects, and have little or no impact on other organisms. We will have more to report on this next year. In the meantime, keep your eyes on the shrubs and let us know what you see!

Table 1. Summary of damage to viburnums as reported by VLB Citizen Scientists in 2003. Susceptibility ratings are based on earlier field observations and those found in the literature.

Species	Damage (number of plants observed)
Most susceptible	
V. opulus/trilobum	extensive defoliation (49)
V. dentatum	extensive defoliation (25)
V. sargentii	moderate to extensive defoliation (2)
Moderately susceptible	
V. acerifolium	eggs and larvae present (2)
*V. carlcephalum**	light to heavy infestation (2)
V. lantana	occasional larvae (2)
V. lentago	moderate damage, but much less than nearby susceptible species (9)
*V. macrocephalum**	moderate damage (3)
V. pragense	no damage (1)
V. prunifolium	no damage (1)
Resistant	
V. burkwoodii	minor damage (3)
V. carlesii	little or no damage (9)
*V. lantanoides/alnifolium**	minor damage (8)
V. plicatum f. tomentosum	very little feeding damage (13)
V. rhytidophylloides	little or no damage (1)
V. rhytidophyllum	adults present, but little or no damage (2)
V. sieboldii	no damage (1)

***** indicates species for which we did not previously have information regarding susceptibility.