Repellency of *Allium* Extracts on Two-Spotted Spider Mites

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Nature of Work: Two-spotted spider mites, Tetranychus urticae Koch, feed on many host plants in nurseries and greenhouses, and may be considered the most serious pest of ornamentals in the southeastern United States (1). Nurserymen and greenhouse growers usually rely on pesticide applications for mite control.

As an alternative to synthetic chemicals, *Allium* (garlic, onions, and chives) and its extracts have been suggested anecdotally in the popular press as a repellent for many arthropods (2-4). Volatiles from the bulbs of *Allium sativum* were shown to have adverse affects on certain insect eggs associated with cotton (5). The object of this research was to assess the repellent effects of garlic extract on two-spotted spider mites.

Allium extracts used in these bioassays were Garlic Barrier® Ag, a commercial insect repellent of 100% garlic juice, and a modified recipe of a suggested organic spray (2) in which 60 ml (2 fluid ounces) mineral oil was added to 125 grams (4 ounces) of garlic powder, then allowed to adsorb for 24 hours. The garlic-oil mixture was then added to a solution of 500 ml (16.5 fluid ounces) water and 15 ml (0.5 fluid ounces) fish emulsion, stirred, and drained through cheese cloth. The Garlic Barrier® Ag and garlic mixture were used in concentrations of 100%, 50%, 20%, and 10%. Water was used as the control. Mature leaves from a lima bean plant (*Phaseolus*) were dipped, one each into each concentration and allowed to dry for two hours. The leaves were then placed on a thin layer of cotton saturated with water in petri dishes. An untreated leaf disc, 14 mm (9/16 inch) in diameter, was positioned in the middle of each leaf, and 10 adult female mites were placed on each disc. Mites remaining on the leaf disc were counted at 15 minutes, 30 minutes, 45 minutes, 1 hour, 2 hours, 3 hours, and 4 hours. The assays were replicated three times on consecutive days.

Results and Discussion: Garlic Barrier® Ag treatment showed significant repellent effects and rate response only at 100% concentration ($P<.002$), with the exception that the 50% concentration was significantly different ($p<.05$) than the control at 30 and 45 minutes (Figure 1). The garlic mixture treatment showed significant repellent effects at all concentrations (Figure 2). Mites preferred to stay on the untreated leaf disc when the garlic mixture was applied at any tested concentration on the treated leaf, demonstrating that the mixture or one of its components

repelled them. This is the first scientific evidence that demonstrates the effectiveness of the extracts of *Allium* as a repellent of two-spotted spider mites.

Significance to Industry: Reducing chemical control in the nursery and greenhouse is desirable to conserve costs, natural enemy populations, and environmental quality. *Allium* extracts may be useful in pest management programs by alleviating the need for repeated pesticide applications and aiding biological control by concentrating mites into biologically active areas. Expectations for field effectiveness are positive.

Literature Cited

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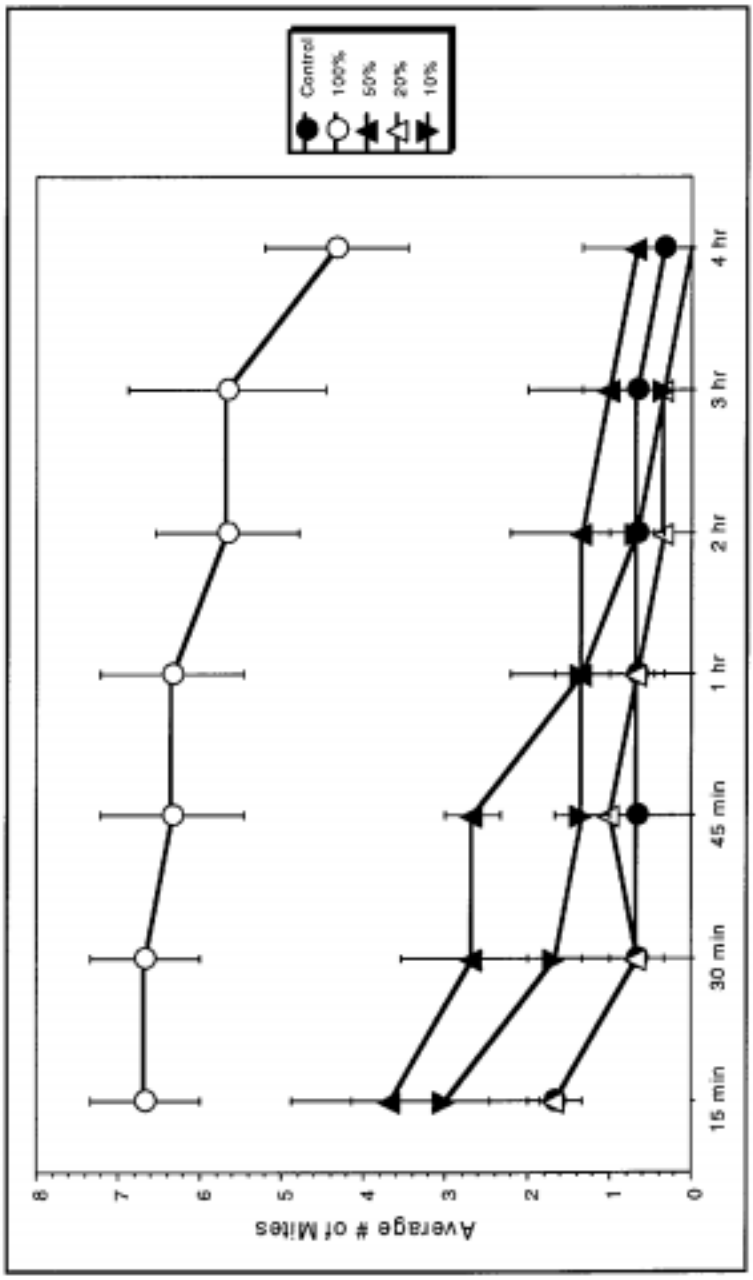

Figure 1: Repellency of Garlic Barrier® Ag on two-spotted spider mites. Values indicate number of mites remaining on untreated leaf discs placed on bean leaves treated with Garlic Barrier® Ag concentrations.

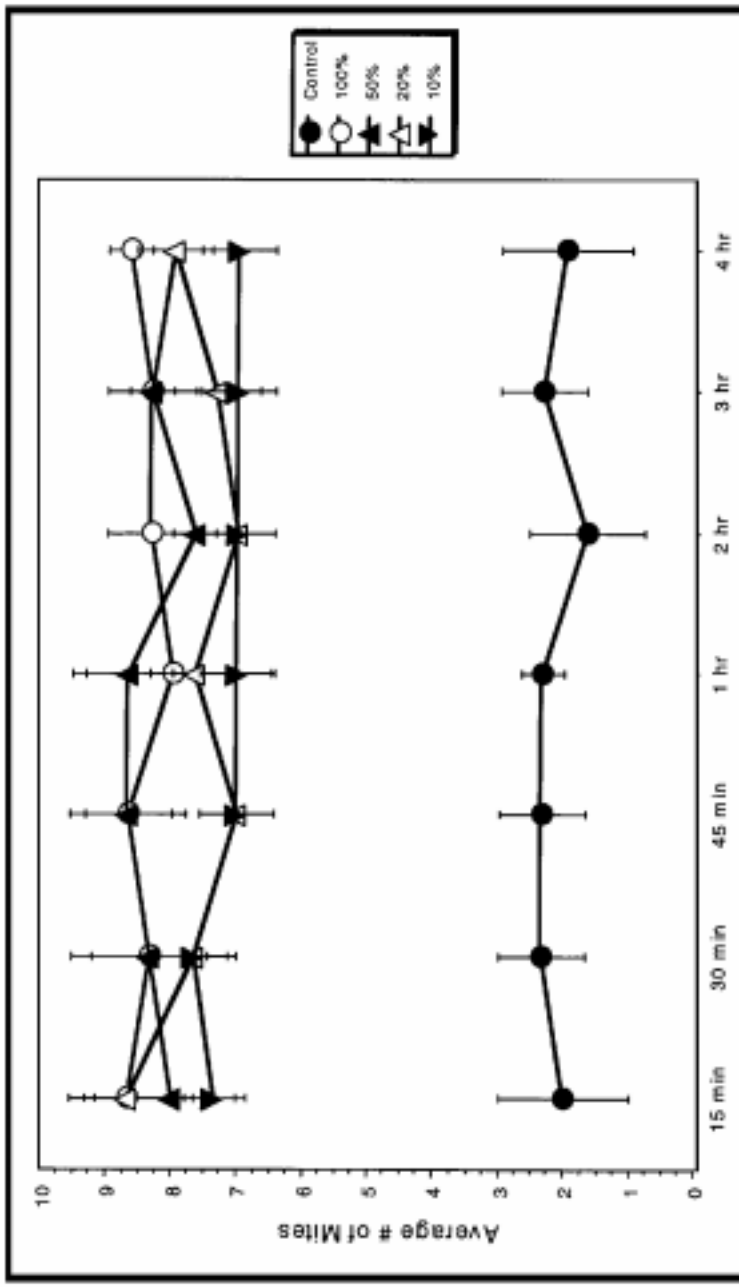

Figure 2: Repellency of the garlic mixture on two spotted spider mites. Values indicate numbers of mites remaining on untreated leaf discs placed on bean leaves treated with the garlic mixture concentrations.