

Pest Control

Research evaluates insecticide use and control of a common greenhouse pest



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FUNGUS gnats (*Bradysia* spp.) are major insect pests of greenhouse crops and can cause economic losses across a wide range of crops during stock plant, propagation and finished plant production. Female fungus gnat adults lay

eggs in growing media, and the emerging larvae feed on the roots and crown.

Fungus gnat management is an ongoing focus of our research team. The objective of the study reported here was to evaluate the efficacy of different insecticides applied as media drenches. The notable feature of this study was that we tested insecticides at several geographic locations simultaneously. We used poinsettia as a model test crop because it was grown in all the collaborating greenhouses.

Research Methods

Six-inch poinsettias were grown in eight greenhouse locations that included seven commercial growers in Colorado, Michigan, New Hampshire, New Jersey and the University of New Hampshire (UNH). Ten containers received each insecticide treatment in each location. There were a total of eight insecticides evaluated and a control that did not receive an insecticide treatment.

In the commercial greenhouses,

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the experimental plants, those receiving the treatments, were grown and managed alongside commercial crops. Insecticide sprays or media-applied fungicides were permitted, but no insecticide drenches were applied other than the experimental treatments. At UNH, no insecticides or fungicides were applied other than the experimental treatments.

Only one media drench application was made in the commercial greenhouses. For those insecticides labeled for multiple applications, two applications were made for several treatments at UNH (see Figure 1). Because the study was part of our Young Plant Research Center program, we were interested in fungus gnat control across a wide range of floricultural crops, rather than just poinsettia. We therefore allowed some treatments that were not labeled for poinsettia. There were two applications of Distance at UNH, although Distance should only be applied once to poinsettia, and Adept was used even though this insect growth regulator is not registered for poinsettia. In addition, DuraGuard, which is normally applied as a spray to the growing medium surface for fungus gnat control, was applied as a full-volume drench.

Insecticide applications were made on Oct. 18, 2005. For those treatments at UNH that received two applications, there was an additional drench application two weeks earlier on Oct. 4, 2005.

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Twenty-four hours after the Oct. 18 application, each plant was cut off at the surface of the growing medium line using clippers, and the containers with growing media were placed in separate bags for 28 days. A yellow sticky card was placed on the surface of the growing medium. Any adult fungus gnats emerging from the growing medium were caught on the yellow sticky card and counted.

Results and Discussion

Counts in the untreated control containers varied greatly between each location, from a high of 121 fungus gnat adults emerging per container to a mean of less than one fungus gnat adult per container. This may be due to the variability in pest pressure between greenhouses. Because each adult fungus gnat female can lay up to 300 eggs, populations can rapidly increase, so it is

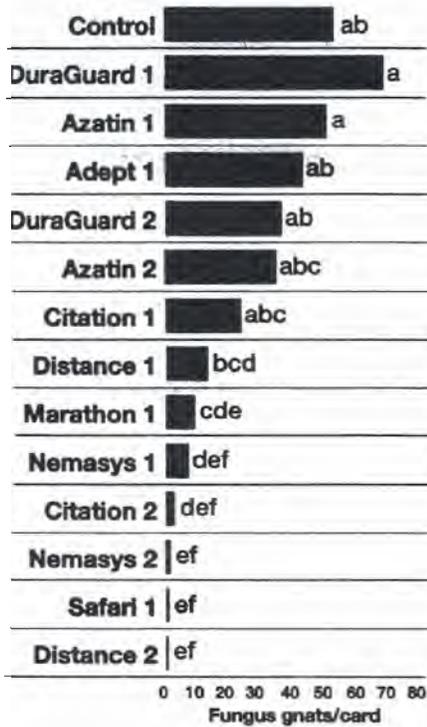
essential to keep fungus gnat numbers low before planting and early in the crop production cycle. Some operations in the study were able to "empty out" their greenhouses before the poinsettia crop was started, which effectively eliminated any carryover pests.

Fungus gnats may be initially present on rooted cuttings or in growing media. Because fungus gnat life stages occur both above (adults) and in growing medium (larvae), both sprays and drenches of insecticides are typically required. However, the use of spray applications in dealing with fungus gnats differed among the locations.

Crop conditions varied among the locations, and fungus gnat development is favored by overwatering, high humidity and low light levels, which impact drying of the growing medium. In addition, growing media that high moisture and greenhouses that have soil rather than concrete floors tend to favor fungus gnat development. There are several *Bradysia* species of insects that we collectively call "fungus gnats," and populations may have varied from one location to another.

Duraguard, Adept and Azatin pro-

Figure 1. Summary of insecticide results from University of New Hampshire with 1 or 2 media drench applications (f1" on Oct. 18 or '2' on Oct. 4 and Oct. 18)



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vided moderate control. For most locations, fungus gnat adult counts were less than 50 percent when compared with the untreated containers. In several locations, however, the number of fungus gnat adults was not significantly different from the untreated (control) for all three insecticides. Note that Azatin may be more effective when applied multiple times.

Citation and Distance provided sufficient control of fungus gnats, as did Marathon and the entomopathogenic nematode product Nemasys.

Safari was consistently the most effective product and provided better control than Marathon. Both Safari and Marathon are neonicotinoid-based insecticides. Overall, fewer than five fungus gnat adults emerged from the Safari-treated containers in all greenhouses.

Figure 1 shows the complete range of treatments at UNH, including the treatments where insecticides were applied twice. Two applications of Citation, Nemasys and Distance were all effective and similar to the con-

trol provided from one application of Safari. However, it should be noted that the label specifies that only one application of Distance be applied to poinsettia, because phytotoxicity has been observed when using this insecticide on poinsettia. Label information for some of the products also included precautionary statements regard-



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For more information on insecticide treatments applied and a summary of single media drench applications used in this research.

ing applications to other crops such as begonia and hibiscus. Although Safari was effective in controlling fungus gnats, it should not be rotated with Marathon because Safari and Marathon have similar modes of action. In addition, Safari should only be applied as a drench once per cropping cycle in order to avoid resistance.

Results from the nematode product Nemasys (active ingredient *Steinernema feltiae*) were encouraging. In a separate

study (organic production of poinsettia) in 2005 with poinsettia in which Nemasys was the only insecticide used, we obtained acceptable control of fungus gnats (although four applications were needed throughout the cropping cycle). Several commercially available products contain the nematode, *Steinernema feltiae*.

Fungus gnats are pests that can be effectively controlled using commercially available insecticides in addition to implementing practices such as sanitation and avoiding excess soil moisture. When testing any new insecticide in your rotation program, always read the label and manufacturer's instruction & Test on a small sample of plants (around 10 to 20) before applying to the entire crop.

We were pleased with the quality of information collected by our grower collaborators, and a similar protocol might be helpful at your location. Finally, avoid using insecticides with the same mode of action (such as Marathon and Safari) in succession. Always use at least two **insecticides with different modes of action** in between using any neonicotinoid-based insecticide. G G