Do certain plants help suppress nematodes that damage other plants? Are tree leaves harmful to vegetable growth? How do home gardeners decide whether to use chemical pesticides or non-toxic alternatives?

The following reports examine these specific questions.

Potential of Ornamental Asteraceae for Suppressing Plant-Parasitic Nematodes in Home Gardens and Urban Landscapes

Eloy Rodriguez

Nematodes that parasitize the root systems of crops are well-recognized pests in agriculture, with growers commonly applying large quantities of pesticides to control their damage. Those treatments are expensive, and the chemicals are often extremely toxic to humans. Consequently their use is restricted by governmental regulations to licensed pesticide applicators. Urban landscapers and home gardeners rarely have the equipment or the state license to apply these chemicals and must find other means to combat damaging nematodes.

Some organic gardeners maintain that specific plants, such as marigolds (*Tagetes erecta* L. and *T. patula* L.) suppress nematode populations, but that approach has never been thoroughly investigated.

In 1973, Gommers, a Dutch nematologist, did an extensive survey of the nematicidal properties of a large variety of plants and found that several species of the sunflower family (Asteraceae) were effective in reducing populations of nematodes in both greenhouse and field conditions. Several of the most effective species are closely related to species that are commonly planted in California gardens, including marigolds, gloriosa daisy or black-eyed Susan (*Rudbeckia*), blanketflower (*Gaillardia*) and *Gazania*. Gommers' results suggested that it might be possible to eliminate 80-90 percent of the parasitic nematodes living in a specific area by planting a crop of those ornamental plants. If this is true it is possible that plant-parasitic nematodes in a home vegetable garden can be controlled with a rotation planting of a flower garden.

Cultivars of *Rudbeckia hirta*, such as Goldilocks shown here, can offer striking displays of yellow inflorescences in the warmer months of the year.

To pursue that theory our laboratory extracted and identified specific chemicals in plants that have nematicidal properties. We examined gloriosa daisy cultivars (*Rudbeckia hirta* L.) and found them to contain a particular group of nematicidal compounds called thiarubrines. Our identification of the nematicidal chemical stimulated us to begin a collaborative project to test the feasibility of using a rotation crop of gloriosa daisy to control the root-knot nematode *Meloidogyne javanica*.

Rotation Crop Trials

We conducted a two-year experiment at the UC South Coast Agricultural Field Station in Irvine where we fumigated a field and divided it into 25 plots that were then

Experimental plot of South Coast Field Station showing young plants of susceptible tomato and the nematode-suppressing gloriosa daisy and marigold. Each treatment, including fallow, was replicated five times.

Root systems of winter squash in plots that had been preceded by (*left to right*) gloriosa daisy, susceptible tomato and nematode-suppressing marigold.

inoculated uniformly with root-knot nematode eggs. Some plots were subsequently planted with tomato (UC 82L) as a susceptible crop, some with the resistant marigold variety Crackerjack, some with gloriosa daisy cultivars Goldilocks and Marmalade, and others were left fallow. After two months the tops of the plants were removed and a root-knot susceptible crop was planted in holes dug one inch from the place where the original crop plant had been planted. They were also planted in the fallow plots. The susceptible plants—winter squash for the first year and a tomato variety the second year—were then allowed to grow, and the fruits were harvested at appropriate times. Soil samples from the test plots were made with an Oakfield probe and the numbers of root-knot nematodes recorded.

Garden Harvests and Nematode Numbers

Harvests in the plots that had been planted with the nematode-resistant crops of marigolds and the commercial varieties of gloriosa daisy were more than twice as large as the crops in the plots that had originally been planted with the susceptible tomato variety. The plots that had been left fallow produced harvests that were smaller in size than the harvests planted with the nematode-resistant crops of marigold and the gloriosa daisy, with differences statistically significant one year but not the other.

Nematode counts gave results that were in general agreement with the harvests. The plots that had been started with the susceptible tomato had very high nematode counts whereas the counts from the other treatments indicated that there were very few plant-parasitic nematodes in those plots.

Other experiments have been carried out that have tested the nematode-suppressing effects of incorporating fresh stems and roots into root-knot nematode infested soil. Unfortunately preliminary experiments with soil incorporation have given results that are less promising than the rotation crop experiments.

The significance of the results from the rotation studies can be seen in the accompanying photo of squash roots. The squash had been raised in soil that had been planted previously with a nematode-suppressing flower garden and shows virtually no damage. The harvest data is equally dramatic and will soon be published in a technical journal.

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