CUTS THAT HEAL:
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New approaches to pest management are information-intensive and require greater understanding of the biology and economics of the pest. There are new tools that aid in the design of cropping and rotation sequence requirements and there is a vast amount of helpful and applicable information readily available on the internet.

PEST MANAGEMENT

Economically and environmentally efficient approaches to managing pest populations are enhanced by developments in Integrated Pest Management (IPM). At the University of California, Davis (UC Davis), guidelines for pest management are accessed through the Statewide Integrated Pest Management Program.

Detailed program information is posted on the website at www.ipm.ucdavis.edu.

Users can access complete IPM programs for specific crops, including strategies for managing diseases, insects and mites, nematodes, weeds and more. In addition, the guidelines list monitoring techniques, pesticides and non-pesticide alternatives.

The website also provides an interactive tool called Nembase. This is a huge and comprehensive database for host status of plants to nematodes.

Nembase is a compilation of the published data up to the late 1990s. Although much information on the host status of plants to nematodes, and on crop cultivars that are resistant to nematodes, is now available on the web and easily searchable, important information buried in the earlier scientific literature is more difficult to access.

Nembase was developed to provide access to that information. It can be used to find resistant cultivars to specific nematodes or to determine whether plants are hosts or non-hosts. It is a powerful tool for designing cropping and rotation sequences.

Nembase contains extensive lists of
Many years of research on plant-parasitic nematodes at UC Davis (http://plantnematology.ucdavis.edu/nemmaplex) has led to the development of Nemmaplex. This tool, described as a virtual "encyclopedia of plant and soil nematodes," is a work in continuous progress that is updated with new developments in the field and new nematode management concepts and tools.

Nemmaplex includes components on nematode life cycle, nematode host range, nematode morphological characteristics, and nematode management. It also includes a valuable component that provides information on the morphological, distribution, biology, feeding habits, and damage potential of important nematode pests of plants.

**Optimizing Sequences**

Crop rotation is a powerful approach to managing population levels of damaging plant-feeding nematodes. Here is an example of how on-line tools like Nemmaplex, Nemmaplex, and other sources can be used to determine cropping sequences that generate maximum returns in relation to a nematode population in a field. The basis of the crop rotation strategy is that plant nematodes feed on the roots of certain plants but not others. In the absence of a food source, population levels of the nematodes decline. When population levels are low enough, a susceptible crop can be grown without appreciable damage from the nematodes. For how many years should non-host crops be grown? The answer, "it depends."

Making optimal cropping sequence decisions for nematodes is easier than for some other pests. The nematode population is already resident in the field and typically completes three to four generations during a cropping season. While they build up to high levels, these levels are measurable and, to some extent, predictable. Population levels of plant-feeding nematodes in the soil can be monitored by soil sampling and analysis prior to planting and at the end of the crop season. So we can determine population levels and estimate the likely economic loss if nematodes are not managed.

Optimal cropping sequences have been determined in most cases, for important crops that are damaged by nematodes with...
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by the production economics and values of the host and non-host crops. In this example, we used arbitrary data for the crop values and have altered only the survival characteristics of the nematode population in the absence of a host crop. The optimum rotation length is determined as the number of years of growing a non-host between host crops at which average annual returns are at a maximum.

Clearly, the economics of the production system and the optimum rotation length are strongly influenced by the survival capabilities of the nematode in the absence of a host crop. Although the survival rate is a biological attribute of the nematode population, it can be altered by various management strategies. Those strategies are reviewed in sources like Nemaplex and include, for example, the use of certain cover crops that directly reduce survival of the nematode or that enhance the activities of natural enemies of the nematode.

(Editor’s Note: Form is the professor of Nematology, University of California, Davis.)

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