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New Trends in Managing Plant Parasitic Nematodes—Introductory Remarks[1]

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The late 1980s and early 1990s should prove to be a most exciting period in the development and application of nematode management technologies. Many opportunities exist in developing new nematode management tools. These tools are most likely to be developed under one or more of the following: biotechnology, biocontrol, environmental manipulation, allelopathy, semiochemicals, and improved nematicides. In addition, challenges in the application of both "new" and traditional tools will be forthcoming because of changes in agricultural production, increased grower awareness of nematode problems, and restrictions on the use of available nematicides.

Background: Principal methods of nematode management have been categorized as follows: plant resistance, cultural manipulation, nematicides, crop rotation, and sanitation (1). Use of one or more of these methods has increased crop yields and production in nematode-infested land. Specific management recommendations for nematode–crop combinations vary and have improved considerably as knowledge has been gained through research.

The rapid growth of nematology began with the development of nematicides during the late 1940s and early 1950s. With the development of DD, EDB, and DBCP, nematologists finally had tools for demonstrating the extent and severity of crop losses caused by nematodes. As a result of these events, scientists were hired or their activities redirected to solve nematode problems in the field. During this period, few agricultural scientists and even fewer growers were aware of nematode disease problems. The new cadre of scientists (nematologists) did a superior job of proving nematode damage and of informing administrators, fellow scientists, and growers about this problem. Today most growers and our colleagues know about the common nematode diseases, and many refer to them by their proper common names. Furthermore, many growers know how to manage nematode problems, at least to the limits of our current nematology research base.

Thus since the 1950s, an awareness of nematode disease problems in agriculture has emerged, and prescription management techniques have been developed for nematode problems on many crops (1). Even with the current awareness of nematode diseases, however, and the broad nematological knowledge base, much needs to be done to further reduce crop losses caused by nematodes (3).

As we move through the 1980s, our capabilities to develop and apply improved nematode management programs will be impacted by at least three major challenges: 1) rapid and dynamic agricultural change, 2) environmental issues and nematicide cancellations, and 3) slow growth of new management technology.

Major challenges: The face and shape of agriculture has always been dynamic and evolving, but we are now seeing even greater changes than during the past decade. Scientific advances in crop production technologies—including higher yielding

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cultivars, multiple-cropping systems, improved cultural practices, sophisticated equipment, computerization, and better management of insects and diseases—have impacted on nematode management technology. These scientific advances, coupled with large scale monoculture and changes in the economic environment—for example, widespread adoption of multi-cropping systems and conservation tillage techniques during the 1980s—tend to accentuate nematode disease problems while limiting choices of management techniques. In fact, a persistent problem for nematologists has been keeping abreast of technological advances in agriculture to prevent nematodes from becoming the limiting factor in crop production.

In the past several years, not only has agriculture continued to change, but some of the most economical and effective nematode management tools—DBCP, EDB, DD—have been removed from use or their use has been restricted severely (2). They became increasingly important, particularly in monocultured and extensive acreage crops (e.g., peanut and soybean), and were often the sole nematode management tools used in such cropping systems. Ironically, in their cancellation and (or) restriction from use they have begun to play another and perhaps their final major role in nematology—that of greatly altering development and application of nematode management programs. Growers, industry, and scientists are concerned because our alternatives are fewer than the needs of agriculture. A. L. Taylor (pers. comm.) commented on the repercussions caused by the loss of DBCP: "This event will certainly have a considerable influence on the future history of nematicides. Perhaps it is the beginning of a new era." I believe Mr. Taylor was correct. We are indeed beginning an era of new nematode management principles and practices.

The future: While agricultural change and the loss of old management tools cause us concern, we must be alert to new opportunities afforded in developing and applying new technology. To that end, this symposium on "New Trends in Managing Plant Parasitic Nematodes" is highly appropriate. The papers to follow will address the prospects of some new trends and techniques, renewed emphasis on others, and the reshaping of some of our ideas on nematode management. Among these are research in soil amendments, conservation tillage, allelopathy, and new nematicide technology. Unfortunately, these "new trends" are few, but it is envisioned that nematologists will renew their enthusiasm and accept the challenge of managing plant-parasitic nematodes in the 1980s and beyond.

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