

MANAGING COTTON WITH A CHANGING ARSENAL OF TOOLS – NEMATODES**T.L. Kirkpatrick****University of Arkansas-Southwest Research and Extension Center****Hope, AR****Abstract**

Plant-parasitic nematodes continue to be a costly and difficult pest to manage in cotton across the United States. Collectively, the root-knot nematode (*Meloidogyne incognita*), the reniform nematode (*Rotylenchulus reniformis*), and the Columbia lance nematode (*Hoplolaimus columbus*) have accounted for an estimated loss of 4-6% of the total cotton crop on an annual basis for the past several years. Economic nematode control, as with the control of weed and insect pests, requires an ongoing management plan that includes a combination of cultural and chemical tools. Unfortunately, while an array of new weapons have been added to our arsenal for managing weed and insect pests, and in some cases diseases, nematode control still relies heavily on cultural strategies and relatively “old” pesticides. For example, a fundamental component of current cotton weed and insect management programs is the use of genetically modified cultivars that express high levels of herbicide and/or insect resistance. This strategy has all but eliminated certain pest species from economic consideration, and while the continued use of these cultivars may lead to concerns, such as the development of resistant pest biotypes or the emergence of secondary pest species as major pests, the technology has revolutionized cotton pest management. Unfortunately, this technology has not been brought to bear for nematode control. There are currently no cultivars with resistance to either *R. reniformis* or *H. columbus* available and only a few cultivars with conventionally derived levels of moderate resistance to *M. incognita*. Similarly, while newer, more effective herbicides and insecticides have entered the marketplace on a regular basis over the last 10 years, very few effective nematicides have been developed. Our current nematicide arsenal includes the soil fumigants 1,3-dichloropropene, metam sodium and metam potassium, a single non-fumigant granular material (aldicarb), oxamyl, a nematicidal carbamate that can be applied as a foliar application for supplemental control, and three seed-applied nematicides. Major concerns with the fumigants are the cost of treatment and the need for specialized equipment for application. Aldicarb’s future availability is somewhat uncertain, and oxamyl has never been marketed as a “stand-alone” nematicide for cotton. A bright spot has been the recent introduction of highly active nematicides that are applied directly to planting seed for early-season nematode suppression. This approach provides both convenience and safety that are not possible with the other products. Unfortunately, seed treatments have had limited efficacy in situations with high nematode pressure.

Nematode management strategies today must begin with a thorough knowledge of the nematode infestation level and the identity of the nematodes involved in each field. Perhaps the most effective long-term management strategy has been crop rotation using non-host or resistant alternative crops to lower nematode population densities. The utility of this approach varies according to geographic location and cropping preference. For example in the southeastern U.S. where peanut is an economically viable crop, this non-host for root-knot, reniform, and Columbia lance nematodes provides an attractive non-chemical option for nematode management. Unfortunately, however, not all infested fields are suitable to rotation, and in the mid-South where peanut is not a popular crop, rotation options for nematode management are much more limited. Similarly, selection of moderately resistant cultivars for fields with a potential root-knot nematode problem can aid considerably in minimizing yield losses, but where reniform or Columbia lance are present, there are no cultivar options that will help. Combining strategies, such as the use of a nematicide combined with a moderately resistant cultivar and a well-planned crop rotation program, should be the primary goal of a sustainable management program. In fields where rotation is not practical and resistance is not available, some growers are considering a site-specific approach to applying nematicides. This strategy utilizes the construction of management zones within individual fields. An array of techniques have been suggested for defining these zones, including the use of soil textural variation, yield maps, or remote imagery. Research has not yet conclusively demonstrated the most efficacious technique for establishing management zones, but recent studies have clearly shown that the use of these zones, regardless of the technique used to establish them,

can be very useful both in targeting nematode sampling and in decreasing the amount of soil fumigant that is needed on a whole-field basis. This site-specific targeting of chemical application appears to be both economically and environmentally much more appropriate than blanket applications of nematicides to entire fields.