UTILIZATION OF MANAGEMENT ZONES FOR RENIFORM NEMATODES IN COTTON

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Abstract

The ability to record measurements of soil electrical conductivity (EC) and field elevation at precise and closely-spaced GPS coordinates allows us to define nematode management zones based on field physical characteristics which may affect reniform nematode (*Rotylenchulus reniformis*) population levels. EC values are highly correlated with soil texture (low values indicate coarser texture and higher values indicate finer texture) and elevation can affect water-holding ability (high elevations may be drier because water drains to lower-elevations). Variation of characteristics within a zone is minimized, whereas differences among zones are maximized. A study was conducted in 2008 in a 40-acre section of an irrigated field near Cochran, GA with both Dothan loamy sand and Nankin loamy sand (both with 2-5% slope). The field had been in continuous cotton and been infested with reniform nematodes for more than 20 years. The field was divided into three management zones (designated MZ1, MZ2, and MZ3 and created using Management Zone Analyst software) based on EC readings 0 to 30 cm-deep, EC readings 0 to 90 cm deep, and elevation. Five replications of five nematicide treatments (8-rows wide and 50-feet long) were randomly assigned in each of the three zones for a total of 75 plots. Nematicide treatments were 1) no nematicide but treated with Cruiser (thiamethoxam) seed treatment for thrips control, 2) Temik (aldicarb) at 3.5 lbs/acre, 3) Temik at 6.0 lbs/acre, 4) Temik at 3.5 lbs/acre plus Telone II (1,3-dichloropropene) at 3 gal/acre, and 5) Temik at 6 lbs/acre plus Telone II at 6 gal/acre. Physical characteristics of the zones differed as follows: MZ3 had coarser soil (lower EC) than MZ1 or MZ2 (which were similar to each other), and MZ2 had higher elevation than MZ1 or MZ3 (which were similar to each other). EC values did not differ among nematicide treatment plots within a zone, and there was no zone x nematicide treatment interaction for EC values. Reniform nematode counts were similar in MZ1 and MZ3, but lower in MZ2, on 9 May and 9 July, and there was no zone x nematicide treatment interaction on either date. Nematode counts averaged across all zones were lower in fumigated plots (receiving Telone II) than in non-fumigated plots on 9 May, 9 July, and 4 September; counts in each of the three individual zones were lower only on 9 May. Only in MZ1 did fumigated plots have lower counts than non-fumigated plots on all sampling dates. Yield averaged across all nematicide treatments did not differ among zones, but yield did differ among nematicide treatments with higher yields occurring in fumigated plots. There was no zone x nematicide treatment interaction for yield. Fumigation increased yield by 13% across all zones, and increases within a zone (17% in MZ1, 9% in MZ2, and 14% in MZ3) were generally related to nematode population levels in the non-fumigated plots (higher nematode counts were related to greater yield increases with fumigation). MZ2 had higher elevation, so it was probably drier than MZ1 or MZ3 regardless of soil texture. Soil moisture may have had more of an effect than soil texture on nematode population levels because MZ2 consistently had the lowest counts in this study. The effect of nematicide treatments was not influenced by soil texture, so soil texture appears not to be a consideration in choosing a nematicide treatment for the range of soil textures in this study. Defining management zones based on field physical characteristics may be useful for reniform nematodes, though the utility is likely to increase as the range of soil textures and elevations increases.