HERBICIDAL AND NEMATICIDAL PROPERTIES OF DRENCH APPLICATIONS OF FURFURAL (2-FURURALDEHYDE)

R. Rodriguez-Kabana
Auburn University and Alabama Agricultural Experiment Station
Auburn, AL 36849
rrodrigu@acesag.auburn.edu

The nematicidal and herbicidal properties of drench applications of furfural (2-furfuraldehyde) were studied in greenhouse experiments. Soil for the nematicide experiment was from a cotton field (silty clay loam; pH 6.0; CEC < 10 meq/100 g soil; org. matter < 1.0%) infested with reniform (*Rotylenchulus reniformis*) and spiral nematode (*Helicotylenchus dihystera*) nematodes as the main plant parasitic species. The soil was mixed 50:50 by volume with fine siliceous river sand and was apportioned in one kg amounts into cylindrical (10 cm diam) l L PVC pots. Furfural (Multiguard Protect ^{R}) was applied by drenching using the requisite amount of a 5% aqueous emulsion for rates of: 50 - 500 mg ai/kg soil (112 - 1120 kg/ha). The total drench volume/pot was 100 mls and a control with 100 ml water/pot was included. Immediately after treatment each pot was covered with a 1.5 mil clear low density polyethylene bag held tight against the outer wall of the pot by a rubber band. There were 7 replications (pots)/treatment and the pots were placed on a bench in randomized complete block design. After 1 week the bags were removed and a soil sample (100 cm^3) was taken from each pot for nematological analyses (salad bowl incubation technique); the pots were then planted (5 seed/pot) with 'Young' soybean (*Glycine max*). After 7 weeks of growth the plants were removed from the soil, the roots were washed, and data were collected on shoot height and on the weights of fresh shoots and roots. The relative health of the root system was assessed subjectively using a scale from 1 - 5, where 1 represented healthy well-developed roots without signs of necrosis or conspicuous damage, and value of 5 corresponded to root systems restricted in growth with numerous blackened areas showing necrotic tissue. Final nematode populations in each soil sample was determined as for pre-plant samples and numbers of nematode in the roots were determined by incubation using the same technique. Pre-plant numbers of reniform and spiral nematodes were reduced in response to furfural doses according to standard decay models. Doses of 150 - 200 mg accounted for over 90% of the reductions. Nematode numbers at termination of the experiment indicated that rates $\geq$ 200 mgs/kg soil were necessary to control both nematodes. Numbers of microbivorous nematodes were initially depressed by increasing rates of the chemical, however, at the final sampling only the two highest doses reduced their numbers. Greatest increases in shoot height and in weights of shoots and roots were in response to rates in the range of 50 to 200 mg/kg soil.

The herbicide experiment was of identical design as the nematicide test. The soil for this experiment was of similar properties as for the nematicide test but from a cotton field without nematode problems. The soil was infested with yellow nutsedge [*Cyperus esculentum*], large crabgrass [*Digitaria sanguinalis*], hybrid pigweed [*Amaranthus* spp], annual morningglory

[*Ipomoea* spp.] and other annual weeds. The soil was used without mixing with sand and furfural was applied at the same rates and manner described for the nematicide test. Variables considered

in this test were the number and species of weeds observed in the pots. The number of weeds in each pot was determined 7, 14, 22, and 31 days after application of the chemical. Furfural failed to control nutsedge but reduced numbers of crabgrass, morningglory and pigweed lineally in response to increasing rates. Applications of the chemical in the range 100 - 200 mg/kg soil resulted in increased numbers of yellow nutsedge. Total number of weeds (minus nutsedge) were suppressed by 70- 90 % with rates $\geq$ 300 mg/kg soil. The data indicate that drench applications of furfural can be useful for controlling parasitic nematodes at rates of $\geq$ 448 kg ai/ha but that acceptable herbicidal activity will require rates >672 kg ai/ha.