NEMATICIDAL AND HERBICIDAL PROPERTIES OF FURFURAL-BASED BIOFUMIGANTS

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The nematicidal activity of an emulsifiable formulation of furfural [2-furfuraldehyde; Illovo Sugar Ltd., Durban, South Africa] was studied in a greenhouse experiment with a soil naturally infested with the reniform nematode [*Rotylenchulus reniformis*]. A 5% [v/v] aqueous emulsion of the chemical was added to one Kg amounts of soil to deliver furfural rates of: 50, 100, 200, 300, 400 and 500 uL/Kg soil. The treated soil was mixed well and transferred to lL capacity 10-cm-diam cylindrical plastic pot. Untreated soil [control] and each rate of the chemical were represented in the experiment by 14 pots [replications], one-half of which were covered with a plastic bag held down with a rubber band around the pots while the other 7 were left uncovered. The pots were placed on a greenhouse bench and soil samples for nematological analysis [salad bowl incubation technique] were collected two weeks after application of the material. Numbers of the reniform nematode in soil declined sharply in direct response to increasing rates of furfural with the sharpest reductions in numbers occurring at rates $\leq$ 200 uL/Kg soil. There were no nematodes in samples from covered pots that received furfural at rates $\geq$ 200 uL/Kg soil. The reniform nematode was not eliminated in any of the samples from uncovered pots. In another greenhouse experiment of identical design an aqueous emulsion containing 17% furfural was added at rates of 170 - 1700 uL a.i./Kg soil to a soil infested with crab grass [*Digitaria sanguinalis*], purple nutsedge [*Cyperus rotundus*], Jimson weed [*Datura stramonium*] and a variety of other weed species. In the covered pots application of the chemical at rates $\geq$680 uL/Kg soil eliminated all weeds 14 days after application of the chemical but in the uncovered pots only the two highest rates resulted in consistent and adequate control [>70%] of most weeds. In other experiments mixtures of furfural with small amounts [<20%] of mustard oil or various naturally occurring isothiocyanates applied to soil resulted in superior nematicidal and herbicidal activities than were obtained from furfural alone or the other active ingredients in the mixtures. Data from these experiments indicate that a variety of effective broad-spectrum formulations of furfural can be developed for control of economically important soil-borne pests.