

NEMATOTOXICITY OF PROPYLENE OXIDE AND ALLYL ISOTHIOCYANATE

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The nematotoxic properties of 3 aqueous solutions containing 2.0% (v/v) propylene oxide [PROPOX], 0.2% (v/v) allyl isothiocyanate [ALISO], and 2.0% propylene oxide + 0.2% allyl isothiocyanate [PROPALISO], were studied in a greenhouse pot experiment with soil from a cotton field infested with the root-knot nematode [*Meloidogyne incognita*]. The solutions were added to soil at rates of 2 - 10 mls /Kg soil in increments of 2 mls, representing rates [mgs a.i./Kg soil] of 40 - 200 for PROPOX, 2 - 10 for ALISO, and 44 - 220 for PROPALISO. All pots were covered with standard polyethylene [1 mil] immediately after application of the chemical. There were in the experiment a control and 16 treatments each with 8 replications [pots] arranged in a randomized complete block design. After two weeks, the covers were removed, soil samples for nematological analyses [salad bowl incubation technique] were collected and two 4-week old 'Rutgers' tomato [*Lycopersicon esculentum*] seedlings were planted/pot. Numbers of *M. incognita* juveniles declined sharply in response to applications of ALISO and PROPALISO; there were no juveniles in soils treated with any rate of these solutions. In contrast, numbers of juveniles in samples from PROPOX-treated pots were either unchanged or increased sharply. Populations of *M. incognita* juveniles in soil and roots at termination of experiment 8 weeks after planting were *nil* in response to all ALISO treatments and to PROPALISO at rates ≥ 4 mls solution/Kg soil; PROPOX treatments were ineffective in controlling *M. incognita* in roots or soil. Final populations of microbivorous nematodes in roots and soil were highest in pots with the two lowest rates of ALISO and PROPALISO and lowest in those treated with the 3 highest rates of these solutions; PROPOX applications had either no effect on microbivorous nematodes or stimulated their populations. Shoot height and weights increased directly in response to PROPOX rates; root weights were increased by all PROPOX treatments but the lowest. All plants from PROPALISO-treated pots had taller and heavier shoots and roots than the control; the greatest response to PROPALISO was with the two lowest rates of the solution. The only ALISO-treatments resulting in increased shoot height and weights of shoots and roots were those with the two lowest rates; all other applications had no effect on these variables. The worst looking root systems in the experiment were those of control plants and of plants in PROPOX-treated pots. Applications of PROPALISO markedly improved root health in proportion to the dosage; roots from soils treated with the 3 highest rates of this solution were the best looking in the experiment. All ALISO treatments improved root appearance compared with the control; however, a marked worsening in root appearance was observed in response to rates ≥ 6 ml/Kg soil. Results indicate that there is a degree of synergism between propylene oxide and allyl isothiocyanate as suggested by tomato plant response and control of *M. incognita*. The combination of these chemicals may permit significant reductions in the rates of propylene oxide required for control of plant pathogenic nematodes.