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Color	☐
Number of Images	4
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PHYTOTOXIC EFFECTS OF HIGH CONCENTRATIONS OF FOLIAR-APPLIED ORGANOPHOSPHORUS INSECTICIDES ON AGRONOMIC CROPS

B. C. Wolverton and A. L. Young
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Data relating the tolerance of agronomic plants to repetitive aerial applications of organophosphorus insecticides is of interest to pest control programs. The organophosphorus insecticides 2-carbomethoxy-1-methylvinyl dimethyl phosphate (mevinphos) and a mixture of the two isomers O,O-dimethyl S-[2-(ethylthio) ethyl] phosphorothioate and O,O-dimethyl O-[2-(ethylthio) ethyl] phosphorothioate (methyl demeton) were applied to the foliage of fifteen economically important plants at the rate of 5.5, 11, 22, and 44 kg active ingredient per hectare. Data on morphological and phytotoxic effects were taken 1, 3, 7, and 10 days after treatment. Statistically significant differences were observed when plant species, insecticide and concentration parameters were evaluated. In general, broadleaf plants were more susceptible to the insecticides than were grasses. Despite severity of initial damage, all plants recovered within 30 days of treatment except soybeans.

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THE EFFECTS OF AGRONOMIC [illegible]S ON THE METABOLISM OF PHORATE

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The insecticide O,O-diethyl-S-ethylthiomethyl phosphorodithioate (phorate) was foliarly applied (0.2 ml) to tomato (Lycopersicon esculentum Mill. var. Homestead) and sorghum (Sorghum vulgare Pers. var. Wiley and Honey) at concentrations of 14,250 and 7,750 ppm in vegetable oil, respectively. A hexane-acetone-water system partitioned phorate during maceration of the plants allowing analysis of the aqueous layer for cholinesterase inhibiting metabolites and/or breakdown products. Cholinesterase inhibition was expressed as a percentage value obtained from a ratio of cholinesterase activity of the metabolite extract to a control extract. The data showed that a definite plant variety dependent distinction existed in the formation of toxic phorate metabolites and/or breakdown products as shown by in vitro anticholinesterase activity recorded over a period of twenty-five days. Distinct differences of maximum and minimum values of cholinesterase inhibition were noted between the three plants. The same concentrations of phorate were placed on glass plates and exposed to the same conditions as the plants; observations of in vitro anticholinesterase activity showed little similarity to activity recorded for the plants.

PHYTOTOXIC EFFECTS OF HIGH CONCENTRATIONS OF SOIL-APPLIED ORGANOPHOSPHORUS INSECTICIDES ON AGRONOMIC CROPS

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Data relating tolerance of agronomic plants to soils contaminated with high concentrations of organophosphorus insecticides may emphasize the need for decontaminating soils following accidental spillage. The insecticides 2-carbomethoxy-1-methylvinyl dimethyl phosphate (mevinphos) and a mixture of the two isomers O,O-dimethyl S-[2-(ethylthio) ethyl] phosphorothioate and O,O-dimethyl O-[2-(ethylthio) ethyl] phosphorothioate (methyl demeton) were soil applied to fifteen economically important plants at the rate of 110, 220, 440, and 880 kg active ingredient per hectare. The separate statistical analysis of the several days (1, 3, 7, and 10) on which measurements (damage ratings) were taken indicated that the effects of damage were clearly manifested by the seventh day. The fifteen plant species could be divided into eight groups on the basis of similar phytotoxic responses to the insecticides.