SENSITIVITY OF MINOR CROPS GROWN IN MICHIGAN TO ISOXAFLUTOLE CONTAMINATED IRRIGATION WATER. Eric A. Nelson and Donald Penner, Graduate Research Assistant and Professor, Department of Crop and Soil Sciences, Michigan State University, East Lansing, MI 48824.

Isoxaflutole is a preemergence herbicide used to control both annual grass and broadleaf weed species in corn. The labeled rates for isoxaflutole range from 75-140 g a.i./ha. Isoxaflutole is not currently labeled for use in the states of Michigan, Minnesota, or Wisconsin. One of the concerns regarding isoxaflutole and its metabolites is potential mobility in soil and that under high rainfall conditions contamination of groundwater may occur. Another concern is the sensitivity of many vegetable crops to isoxaflutole. A greenhouse experiment was conducted to evaluate and rank the sensitivity of nine minor acreage crops grown in Michigan to water containing known concentrations of isoxaflutole. Combined, the area of production of those crops in Michigan is over 550,000 ha.

The crops evaluated were: adzuki bean, alfalfa, carrot, cucumber, dry bean (navy and black beans), onion, sugarbeet, and tomato. Plants of each crop were grown in 11 by 11 cm pots filled with a Spinks loamy sand soil until they were approximately 15 cm tall. Once plants reached the 15 cm in height, they were treated with 2.5 cm of irrigation water containing isoxaflutole over the course of 1 hr. Isoxaflutole concentrations increased by a factor of two beginning at 6 parts per billion (ppb) for the most sensitive crops, navy and black bean. The highest concentration applied was 400 ppb, applied to onion. Each species was treated with three concentrations of isoxaflutole as well as an untreated control. Visible injury and plant height were evaluated 14 and 28 DAT, and dry weights were measured 28 DAT. Percent injury, height, and dry weights were regressed against isoxaflutole concentration. Percent visible injury resulted in the highest r^2 values. Therefore, visible injury was used to calculate GR_{20} values.

Of the crops evaluated, navy bean and black bean were the most sensitive and onion was the most tolerant to isoxaflutole. The concentrations of isoxaflutole required to cause a 20% level of injury to the crops 14 DAT were: Navy and black bean, 8 parts per billion (ppb); sugarbeet, 20 ppb; alfalfa, cucumber, and tomato, 43-47 ppb; adzuki bean, 60 ppb; carrot, 79 ppb; and onion, 238 ppb. The concentrations required to cause the same amount of injury at 28 DAT were lower, indicating lack of recovery between 14 and 28 DAT, injury increased instead. Navy, black, and adzuki bean exhibited the most severe increase in injury from 14 to 28 DAT. On a per-area basis, the tolerance of the crops to isoxaflutole applied in irrigation water when plants were 15 cm tall was much greater than for preemergence applications of isoxaflutole. It has been documented that as plants mature, their tolerance to a herbicide application often increases. Therefore, we can expect that if irrigation water contaminated with isoxaflutole was applied at earlier growth stages the sensitivity would be greater.

2002 North Central Weed Science Society Abstracts 57:42.