DISSIPATION AND CARRYOVER OF IMIDAZOLINONE HERBICIDES IN IMIDAZOLINONE-RESISTANT RICE

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ABSTRACT

The development of Imidazolinone (IMI) Resistant (IR) rice now allows rice producers to selectively control red rice (Oryza sativa, O. rufipogon, and O. nivara), weedy relatives of commercial rice (O. sativa). Imazethapyr the primary herbicide used with this technology has been shown to be relatively persistent in the soil and may cause injury to rotational crops including non-IR rice. Imazamox has less soil persistence in non-flooded environments; however, this herbicide has not been studied in rice environments including flooded soils.

Thirteen selected treatments of two and three sequential applications of imazethapyr and imazamox were applied to IR rice in 2004 and 2005. In 2005 and 2006, non-IR rice was planted into the previous years' plots to evaluate herbicide carryover. Studies were conducted on two soils commonly utilized for rice production: a DeWitt silt loam and a Sharkey clay soil. Treatments included several variations including common programs with imazamox added, double-rate treatments, and imazamox-only treatments and treatments where imazamox was substituted for imazethapyr. Non-IR rice was evaluated for carryover injury at preflood and 2-week postflood timings. No injury was observed on the silt loam soil in 2005 or on the clay soil in 2006. The addition of imazamox at the preflood in 2005 on the clay soil to any treatment was the main factor increasing injury to significant levels. In 2006 on the silt loam soil, doubling the imazethapyr rate was

the main factor increasing injury. However, in all cases, injury was low and in some instances treatments that caused or did not cause injury did not correlate to the herbicide rates applied.

To further investigate imidazolinone dissipation, imazethapyr, imazamox and imazapyr were applied to flooded and non-flooded plots on silt loam and clay soils. Soil damples were taken periodically during the year following application. Samples were frozen to stop dissipation. Soil samples were tested using a bioassay and standard curve. From this information, dissipation rates and half lives were estimated. Visual injury was found to provide the best measurement of herbicide quantity in the soil. Half lives for imazamox were found to be 16 d on flooded silt loam, 8 d on flooded clay. Half lives were longer under non-flooded conditions with half lives of 270 and 13 d being calculated on silt loam and clay soils. Imazethapyr half lives ranged from 5 d on flooded clay to 128 d on non-flooded loam. Half lives calculated for imazapyr ranged from 8 to 78 d under flooded and non-flooded conditions on the clay soil, and from 50 to 539 d on the silt loam soil. The active herbicide concentrations declined more quickly under flooded conditions as compared to non-flooded conditions, regardless of soil type. However, dissipation occurred faster on the clay soil as compared to the silt loam.