

COMPARISON OF THE ECO-EFFICIENCY OF CONVENTIONAL AND GLYPHOSATE-RESISTANT SUGARBEET HERBICIDE TREATMENTS

Carl W. Coburn* and Andrew R. Kniss
University of Wyoming, Department of Plant Sciences
1000 E. University Avenue, Laramie, WY 82071

The rapid adoption of glyphosate-resistant sugarbeets has largely displaced conventional production. Eco-efficiency analysis allows the comparison of production systems by quantifying the level of output per unit of input environmental risk. Using herbicide treatment and yield data from studies located in multiple growing regions in the U.S., an eco-efficiency analysis was performed on conventional and glyphosate-resistant herbicide treatments. The risk quotient method for various impact categories based on toxicity and amount applied enables a measurement of the environmental risk for an herbicide. The models GENECC2 and SCI-GROW were used to estimate potential surface and ground water concentrations resulting from herbicide treatments. Avian, aquatic, and terrestrial risk was determined using widely available toxicity data for indicator species. The eco-efficiency of herbicide treatments was measured by dividing the yield by the sum of the risk-quotients of each herbicide for a particular impact category. Greater values of eco-efficiency correspond to less environmental risk per unit of sugar production.