

ECONOMIC EVALUATION OF SITE-SPECIFIC HERBICIDE APPLICATION. J. Anita Dille, Tyler W. Rider, Jeffery W. Vogel, and Kevin C. Dhuyvetter, Assistant Professor, Department of Agronomy, Graduate Research Assistant, Department of Agricultural Economics, Graduate Research Assistant, Department of Agronomy, and Professor, Department of Agricultural Economics, Kansas State University, Manhattan, KS 66506.

It is known that weed pressure is not regular across a field and thus, the uniform application of herbicides to spatially variable weed populations in fields means that some areas receive the correct amount of herbicide, other areas of the field receive excess herbicide when there are no weeds present to warrant it, and still other areas of the field with high weed pressure receive too little herbicide. Variable rate technology allows producers to apply such inputs at the appropriate rates where needed. In this study, an algorithm was developed to determine economic optimal postemergence herbicide rates, models were created to determine the impact that variable postemergence rates have on crop yield, and same models used to determine whether the additional costs of site-specific herbicide application were recovered. A total of five fields across Kansas were studied in 2003: two cooperated corn fields and on-station, one soybean and two grain sorghum fields. Preemergence herbicide was applied in strips (0, 1/3, 2/3, and 1X of recommended) on the grain sorghum and soybean fields. Weed species were identified and counted in 1-m² quadrats on a regular 7.6 x 7.6 m grid. The site-specific postemergence herbicide decision algorithm was developed to solve for an economic optimal herbicide rate for each grid-cell in the field area. This was based on estimating yield loss caused by weed pressure within each grid-cell and the expected response of weeds to herbicide application rate. The site-specific herbicide rate and four standard herbicide rates (0 to 1X of recommended rate) were applied to half of each preemergence strip using a split-plot design. Weed counts taken three weeks after application found that the site-specific treatment controlled the weeds present in the fields. Finally, crop was harvested and grain yield recorded using a yield monitor. The yield models estimated from the data from the portions of the field where standard postemergence herbicide rates were randomly applied indicated that the postemergence herbicide application had a positive but insignificant yield impact. The \$13.99/ac average difference in estimated profit between site-specific and uniform full label rate applications covers all costs associated with adopting site-specific postemergence herbicide application.