

EFFECT OF IMAZETHAPYR AND IMAZAPYR ON POLLINATION OF IMIDAZOLINONE TOLERANT CORN. James H. Herbek, James R. Martin, and Jonathan D. Green, Extension Professors, Department of Agronomy, University of Kentucky, Princeton, KY 42445.

Occasional problems in seed-set have occurred with imidazolinone tolerant corn treated with postemergence applications of the premix of imazethapyr at 0.672 oz ai/A plus imazapyr at 0.224 oz ai/A. Symptoms of deformed ears varied from twisted rows, pinched ears, scattered kernels, to barren ears. It has been debated how this injury is related to the pollination process and whether such factors as environment, application timing, and hybrid play a role in this problem.

The 2002 study involved foliar applying the premix on three hybrids at 3, 4, and 5 weeks after crop emergence. Anther emergence had completed before a visual evaluation of corn tassels could be made; however, general field observations indicated the amount of "spent" anthers that dropped from the tassel on corn leaves and on the soil surface was noticeably less only where Pioneer 34B28 was treated at 5 weeks after plant emergence. Plants for this hybrid were at the V9 growth stage and had an average height of 42 inches when treated.

It was decided to continue research efforts with emphasis on timing of application only on the Pioneer 34B28 hybrid. The study in 2003 involved applying the permix at 3, 4, 5, and 6 weeks after crop emergence. Average corn height was 11, 17, 24, and 32 inches, respectively; whereas, corn growth stage was V4, V5, V6, and V8, respectively. A visual estimate of the percent of tassel occupied by emerged anthers on ten consecutive plants was made on July 3, 2003. The estimates for plants treated at corn growth stages V4, V5, V6, and for the non-treated check ranged from 34 to 44% and were statistically equal but greater than the 4% observed for plants treated at V8 growth stage. A visual rating of ear deformity was made at corn harvest on Sept 3, 2003 and was based on anomalies from tip to butt of the ear. Although no statistical differences in ear deformity occurred, the percent of deformed ears tended to be greater for plants treated at V8 growth stage compared with those from the other treatments. Corn yields for all treatments in 2003 were equal, consequently, they did not correlate with difference in emerged anthers on tassels.

The emphasis of the 2004 study was to limit the application timing to V8 growth stage, since this appeared to be the optimum stage for achieving a response in regards to inhibited anther development / emergence. It was also decided to increase size of plots and buffer areas in an attempt to limit drift of pollen from non-treated corn to treated corn. The size of plots for the 2004 study was doubled by increasing the length from 25 feet to 50 feet and increasing the buffer areas on each side of plots from 4 rows to 16 rows. Also, the corn planted in the buffer areas was delayed approximately 3 weeks to insure that pollen development in the buffer strips would be delayed and not coincide with silk development / receptiveness in the treated areas. The premix was applied to Pioneer 34B28 corn when plants averaged V8 growth stage at a plant height of 29 inches. This occurred at approximately 5 weeks after corn emergence. Anther emergence, silk development, and ear deformity were monitored in a flagged area of each plot consisting of ten consecutive plants occurring in each of the two center rows of the treated and non-treated plots. Daily ratings of the percent of the central tassel spike occupied by emerged anthers were made from June 22 through July 4, 2004. These results indicated a delay in anther development and fewer emerged anthers in the treated corn compared with the non-treated corn. By July 4, 2004 the estimates were 25% for the treated plants and 98% for the non-treated plants. The fact the length of ear silks on July 4 were nearly twice as long in the treated corn than in the non-treated corn suggested that pollination may have been limited in the treated corn. However, observations of ears of mature plants indicated that pollination and fertilization did occur in the treated plots. A rating for ear deformity, based on twisted rows or pinched ears, indicated up to 10% deformity for treated plants. The magnitude of ear

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deformity was less than expected based on the differences in anther and silk development between treated and non-treated corn. Therefore, increasing the size of plots and buffer areas may not have limited the risk of cross- pollination from occurring in the 2004 study.

In summary, the premix of imazethapyr plus imazapyr limited anther emergence / development when applied at the label rate to Pioneer 34B28 at V8 to V9 growth stage. The growth stage of plants may be a better indicator for determining when corn is more prone to injury than height of plants or weeks after emergence. The design of these experiments may not have prevented cross - pollination from occurring.