

Effects of 2,4-D Timings and Rates on Cotton Growth and Yield. J.D. Everitt, J.W. Keeling, and P.A. Dotray, Texas Agricultural Experiment Station and Texas Tech University, Lubbock.

ABSTRACT

Cotton production in the Texas High Plains is challenging due to early season severe weather including wind, hail, and excessive rainfall, erratic seasonal rainfall, and occasional cool, wet fall and early freezes. These challenges are occasionally compounded by man-made problems including herbicide drift to susceptible crops. Cotton production has increased in the central and northern High Plains regions of Texas over the last 3 to 5 years. These areas have traditionally produced large acreages of wheat, corn and sorghum, and include large grassland areas where the use of 2,4-D is common. Cotton acreage in the Texas Panhandle and Northern High Plains has increased from 600,000 acres planted in 1998 to 900,000 acres in 2002, and this trend has continued. In this same district, approximately 700,000 acres of corn, 980,000 acres of grain sorghum, and 2,400,000 acres of wheat are also produced. These expanding cotton areas are at high risk of exposure to drift of 2,4-D. Cotton is highly susceptible to injury from 2,4-D, even at extremely low rates. Injury to cotton from 2,4-D is characterized by leaf malformation (strapping, cupping), stem malformation (twisting and curling), callus formation, delayed or lack of fruit retention, and delayed boll maturity. Little information is available that clearly identifies the relationship between exposure level, crop injury, and cotton yield reductions following 2,4-D drift. Previous research has focused mainly on injury, but has not made a correlation between injury and yield loss. The objectives of this study were to determine the effects of 2,4-D applied at varying rates and growth stages on cotton growth and yield, and to correlate cotton injury levels and effects on cotton lint yield and fiber quality to aid management decisions.

Studies were initiated at the Texas Agricultural Experiment Station in Halfway, TX in 2004 on an Olton clay loam. Cotton (FM 960 BR) was planted on May 11. Applications of 2,4-D were made at four growth stages including: cotyledon to 2 leaf, 4 to 5 leaf, pinhead square, and first bloom. Rates of 2,4-D included: 0.25 (1/2X), 0.125 (1/4X), 0.063 (1/8X), 0.025 (1/20X), 0.0025 (1/200X), and 0.00025 lbs ai/A (1/2000X). Visual injury was recorded at 14 days after treatments (14 DAT), and cotton was harvested and ginned to determine lint quality.

2,4-D (0.025 lb ai/A and greater) visually injured cotton 15 to 78% 14 DAT when applied at cotyledon to 2 leaf and 4 to 5 leaf cotton, and visual injury levels ranged from 40 to 90% by the end of season. Applications made at pinhead square and first bloom visually injured cotton similar to the cotyledon to 2 leaf and 4 to 5 leaf stages. Cotton lint yield was reduced 66% following 2,4-D at 0.025 lb ai/A (1/20X) applied at pinhead square, but only resulted 16% yield reduction when 2,4-D was applied at cotyledon to 2 leaf. 2,4-D injured cotton at rates as low as 0.025 lb ai/A (1/20X) applied at cotyledon to 2 leaf, pinhead square, and first bloom. Rates as low as 0.0025 lb ai/A (1/200X) visually injured cotton when applied at 4 to 5 leaf. Yield was most affected by pinhead square applications, with yield reductions observed following 2,4-D at 0.0025 lb ai/A (1/200X). This result indicates that pinhead square is the most susceptible stage for cotton yield loss. The correlation between visual injury and yield loss varied by application timing. 2,4-D applications had little effect on lint quality when applied at any growth stage.