COMPETITION AND SEED-RAIN DYNAMICS OF VELVETLEAF IN COTTON

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Abstract

Velvetleaf (*Abutilon theophrasti*) is a member of the family *Malvaceae* that has proven to be an intense competitor in several agronomic crops. Much research has been conducted on the interference characteristics of velvetleaf in corn and soybeans while little has been conducted with velvetleaf in cotton. Competitive characteristics of velvetleaf include factors such as seed dormancy, ability to germinate from deep within the soil, prolific seed production, and limited control measures. Past research has reported yield reductions of 2.7% per velvetleaf plant in 33 ft. of row. Yield and harvesting efficiency reductions can be attributed to velvetleaf in cotton as well as a number of other economically important crops. Seed production of economic and sub-economic threshold populations is a concern and there is no published data on this area.

Field experiments were conducted at Clayton, NC in 1997 and 1998 to evaluate velvetleaf for competition and interference characteristics and to determine seed production and seed-rain dynamics when planted at different densities in conventional tillage cotton in North Carolina. Commercial cotton varieties used were BXN 47 in 1997 and Deltapine 51 in 1998. Plot size was 12 X 30 ft. (4 rows per plot). Velvetleaf seedlings at the cotyledon to 2-leaf stage were planted into the center two rows of each plot at densities of 0, 1, 2, 4, 8, 12, 16, and 32 plants per row. All plots were kept weed-free except for velvetleaf for the entire season in both years of the study. All velvetleaf seed were harvested as pods matured. One velvetleaf plant from each plot was mapped throughout the season to determine the node placement of each mature pod. Height measurements for cotton and velvetleaf were taken weekly until 5 weeks after planting and bi-weekly for the remainder of the season.

Results determined that there was no effect on cotton height by any velvetleaf density up to 4 weeks after planting (WAP) in 1997 or 1998. Velvetleaf height was affected by density at all measurement times in 1997, but was not affected until 9 WAP in 1998. In 1998, velvetleaf and cotton achieved maximum height later than in 1997. However, velvetleaf seed production and cotton lint yield was higher in 1998. Differences in velvetleaf fresh weights and stem diameters were not significant in 1997, but decreased significantly as velvetleaf density increased in 1998. Bulk seed production in 1998 was nearly twice the bulk seed production in 1997. The majority of seed were produced higher on the plant in 1997 than in 1998. In both years, higher plant densities of 8, 12, 16, and 32 plants per row forced seed to be produced higher on the plants. In 1997, most seed were produced between nodes 6 and 20 while in 1998, most seed were produced between nodes 1 and 10. In both years, cotton lint yield decreased linearly as density increased. Velvetleaf densities required to cause a 3% yield loss were approximately 6 plants per 30 ft. of row (1450 plants/A) in 1997 and approximately 1 plant per 30 ft. of row (240 plants/A) in 1998. Differences in all parameters over years can most likely be attributed to differences in moisture and heat units produced early in the growing season as well as minor differences in the agronomic characteristics of BXN 47 and Deltapine 51. Additionally, velvetleaf seems to be more sensitive to changes in environment than many other weeds. This is verified by the adaptive ability and competitive nature of velvetleaf as it has previously been more common and troublesome in the midwest than in most southern states.

These results indicate that velvetleaf is a very strong mid-to-late season competitor with cotton. However, velvetleaf should not cause significant yield losses if controlled in the first 4 weeks after planting. Highest lint yield in 1998 was 640 lbs/A with the control density of 0 velvetleaf plants per 30 ft. of row. A 3% yield loss with this yield would cost $14.40/A (with cotton price estimated at $0.75/lb). This level of yield loss would justify the use of Roundup (approximately $7.50/A) or Buctril (aproximately $11.00/A) systems for control of velvetleaf at densities as low as 1 plant per 30 ft. of row (240 plants/A).

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