Chapter VII

Summary

Postemergence (POST) applications of CGA 362622 resulted in transient cotton (*Gossypium hirsutum* L.) injury in all instances. In the field and greenhouse, injury was generally lower with a non-ionic surfactant as an adjuvant than with a crop-oil concentrate (COC) as an adjuvant. The use of a urea-based adjuvant (UBA) also resulted in lower cotton injury than the use of a COC, although preliminary evidence from other studies indicates that control of common lambsquarters may also be lower with UBA than with other adjuvants. Cotton injury was transient in all instances as chlorosis symptoms generally diminished by 21 days after treatment (DAT). While crop stunting generally lasted longer, this injury symptom usually disappeared by 56 DAT. Most importantly, cotton lint yield and fiber quality characteristics were not negatively affected by CGA 362622 application.

Many common and troublesome weeds of cotton were controlled by CGA 362622 application POST. Common lambsquarters (*Chenopodium album* L.), common ragweed (*Ambrosia artemisiifolia* L.), common cocklebur (*Xanthium strumarium* L.), smooth pigweed (*Amaranthus hybridus* L.), *Ipomoea* spp., yellow nutsedge (*Cyperus esculentus* L.), and other species have been controlled in studies on the Eastern Shore of Virginia. However, certain solanaceous and malvaceous weeds including jimsonweed (*Datura stramonium* L.), black nightshade (*Solanum nigrum* L.), spurred anoda [*Anoda cristata* (L.) Schlecht.], and velvetleaf (*Abutilon theophrasti* Medicus) may not be controlled by CGA 362622. A simple solution to this problem may the utilization of tank-mixes of CGA 362622 and pyrithiobac. Tank mixes of these two herbicides controlled more broadleaf weeds than either herbicide applied individually and tank-mix combinations of CGA 362622 and pyrithiobac may serve as effective future treatments in both conventional and transgenic cotton weed control programs.

POST applications of CGA 362622 may also be beneficial for weed control programs in glyphosate-resistant and bromoxynil-resistant cotton. The addition of CGA 362622 to glyphosate controlled many broadleaf weeds more consistently than glyphosate alone. Likewise,

combinations of CGA 362622 and bromoxynil were more effective in controlling broadleaf weeds than either herbicide individually. However, the potential benefit of CGA 362622 to these weed control programs may be greater if not applied as a tank-mix. As glyphosate may only be applied up to the 5-lf stage in glyphosate-resistant cotton, growers may be better served to follow glyphosate applications with a tank-mix combination of CGA 362622 and pyrithiobac. The latter application plus the short residual activity of both CGA 362622 and pyrithiobac may extend weed control season-long and eliminate the time-consuming post-directed (POSD) applications that are usually required. CGA 362622 plus pyrithiobac applications may also be of use in bromoxynil-resistant cotton. Bromoxynil, like glyphosate, has no residual soil activity, but controls fewer weeds than glyphosate. An application of CGA 362622 plus pyrithiobac following bromoxynil would add residual activity and may control weeds that bromoxynil did not. Future research could evaluate these possibilities and determine if these applications are cost-effective and if they would eliminate the need for POSD applications and equipment.

Results of laboratory studies supported crop response and weed control data collected in field and greenhouse studies. While cotton is a tolerant crop, response symptoms usually develop after POST CGA 362622 application. Metabolism of CGA 362622 in cotton was more rapid than in weed species, but may have been slow enough to explain cotton response symptomology. In addition, the low level of absorption and translocation plus the moderate metabolism rate of CGA 362622 in 2-lf cotton likely explains why response symptoms are transient and do not affect cotton yield. Smooth pigweed susceptibility to CGA 362622 may also be explained by rapid absorption, a high degree of translocation, and slow metabolism. Likewise, the intermediate tolerance of spurred anoda is likely due to low translocation and a metabolism rate of CGA 362622 in between that of cotton and smooth pigweed.