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SITE-SPECIFIC WEED MANAGEMENT IN COTTON USING WEBHADSSTM

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Abstract

Current weed management practices rely on herbicides applied uniformly (broadcast or band) across an entire field even though it has been observed that weeds are patchy in distribution. This patchy distribution is ideal for real-time, site-specific weed management. For site-specific applications, a light-activated weed-sensing sprayer was linked to a data logger and global positioning system to simultaneously spray and map weeds. The use of a computer-based decision support system was used to help select weed management inputs. By using site-specific weed management, can effective weed control be achieved while reducing herbicide inputs?

A field experiment was established in 2005 and continued in 2006 at the Texas Agricultural Experiment Station near Halfway to 1) evaluate site-specific weed control and herbicide use compared to conventional broadcast systems; 2) use and modify a decision aid (WebHADSS^{TM} – web based herbicide application decision support system) to assist in herbicide recommendations; and 3) map weed population changes over time.

Herbicide treatments were applied with a tractor-mounted compressed-air sprayer with a 4-row broadcast boom, a 4-row shielded sprayer, and a 4-row weed-sensing hooded sprayer. Treatments included commercial broadcast, variable spray under the hood/continuous postemergence-directed (PDIR) spray at the row (VH/CR), variable under the hood/variable PDIR at row (VH/VR), and a weed-free and weedy control. The weed-sensing sprayer was modified to spray PDIR within the crop row when weeds were detected in the adjacent row middles to create the VH/VR treatment. The variable applications were compared to the broadcast applications to determine percent herbicide savings as well as effectiveness of weed control. WebHADSS^{TM} was used to determine a portion of the treatments based on herbicide efficacy and economics. No residual herbicides were used in the first year of this three-year study; however, a portion of the treatments (Trifluralin at 1.0 lb ai/A PPI or Dual Magnum at 0.98 lb ai/A POST) contained a residual herbicide in 2006. Roundup Weathermax (RUWM) was applied at 0.75 lb ae/A in all treatments, except when WebHADSS^{TM} recommended Aim alone at 0.0156 lb ai/A. Dual Magnum was applied as a tank mixture with RUWM for the early season treatments.
The commercial broadcast applications controlled Palmer amaranth 80 to 100% and Venice mallow 79 to 93% throughout the season. In the variable applications, Palmer amaranth and Venice mallow control ranged from 70 to 93% and 21 to 64%, respectively. The VH/VR applications controlled weeds as effectively as the VH/CR applications throughout the season. The VH/VR application reduced POST herbicide use by 40 to 76% compared to a conventional broadcast system. The VH/CR applications reduced herbicide use by 10 to 63% at a single application with ranges in use likely due to varying weed densities. Although the variable applications saved approximately 30 to 50% on overall herbicide use compared to the broadcast application, weed control was less effective. WebHADSS^{TM} identified herbicide treatments similar to what was suggested by local weed specialists. This study, as well as a study in peanut, will continue a third year with the addition of PRE herbicides.