

Pre-Emergence (PRE) Herbicides influenced Critical Time for Weed Removal in Roundup-Ready Corn

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Widespread and repeated use of glyphosate in Roundup-Ready crops resulted in glyphosate-resistant weeds. As of 2017, 17 weed species have been confirmed resistant to glyphosate across USA, of which at least 6 are present in Nebraska. Therefore, there is a need to diversify weed control programs to reduce reliance on glyphosate. We hypothesized that the use of PRE-herbicides will delay the first (and possibly only) application of glyphosate. However, we did not know the extent of the delay. Therefore, we conducted an experiment at Concord, northeast Nebraska in 2017 to evaluate the influence of PRE herbicides on critical time for weed removal with glyphosate in Roundup-Ready corn. Three herbicide regimes (No PRE, PRE application of Acuron[®] and Atrazine) were compared. Acuron[®] contains four actives (atrazine, bicyclopyrone, mesotrione, and s-metolachlor). Acuron was applied at 3 quart/acre, while atrazine at 2 quart/acre, immediately after planting corn. Weed removal timings with glyphosate were: 3rd (V3), 6th (V6), 9th (V9), 12th (V12), and 15th (V15) corn leaf stages. There were also season-long weed-free and weedy plots. The predominant weed species were common waterhemp, velvetleaf and green foxtail (see photo).

The critical time of weed removal was delayed by PRE-herbicides (Figure 1). Based on 5% acceptable yield loss threshold, the critical time for weed removal ranged from 144 to 375 growing degree days (GDD) which corresponded to the V3, V5 and V10 corn growth stages, depending on the herbicide regime (Table 1). For example, without PRE herbicide, the critical time of weed removal started at V3 growth stage, while PRE application of Atrazine delayed the critical time to V5 growth stage. PRE application of Acuron[®] further delayed the critical time of weed removal to V10 growth stage, which was approximately 6 days to time of corn canopy closure. Weeds that emerge past the time of canopy closure are typically not competitive enough to impact corn yields. Therefore we confirmed that PRE herbicides delayed the need for POST application of glyphosate, and also provided alternative modes of action for fighting glyphosate resistant weeds in corn.

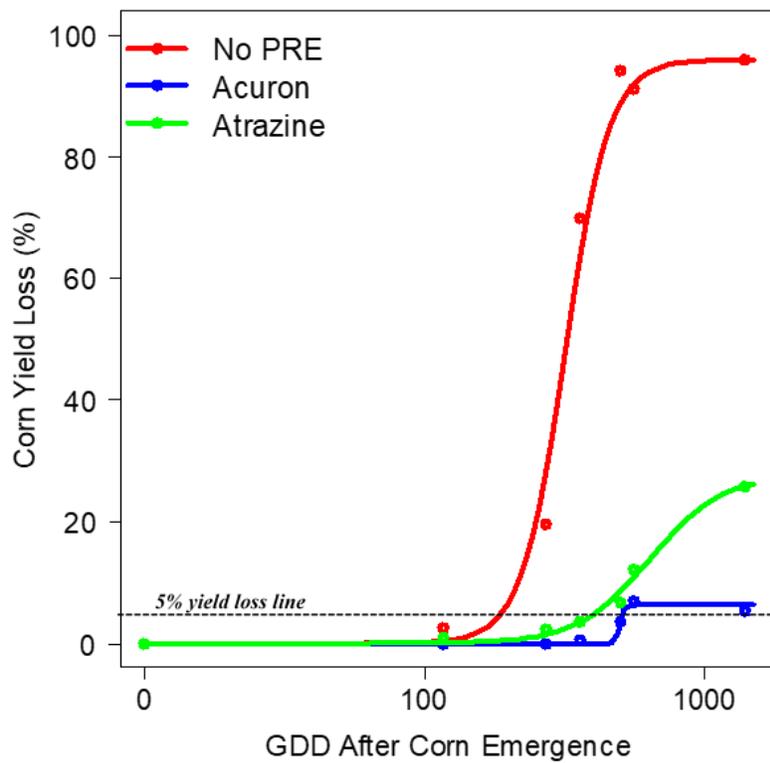


Figure 1: Corn yield loss as influenced by three herbicide treatments (No-Pre, Atrazine and Acuron)

Table 1: Critical time of weed removal in corn based on 5% yield loss with and without PRE herbicide.

Treatment	GDD (SE)¹	DAE²	Corn Growth Stage
NO PRE Herbicide	144 (4)	11	V3
Atrazine	207 (20)	16	V5
Acuron	375 (30)	33	V10

¹GDD, growing degree days; SE, standard error in parenthesis

²DAE, days after corn emergence.



Corn without PRE-herbicide at V12 stage



Corn with Atrazine at V12 stage



Corn with Acuron at V12 stage

5% yield loss line
