USE OF PRE-EMERGENT HERBICIDE ENHANCES THE EFFECTS OF ADVANCED HERBICIDE TECHNOLOGIES

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Abstract

Advanced herbicide technologies of cotton (*Gossypium hirsutum* L.) cultivars reduced pressure of weed control for cotton producers. However, these technologies are not the silver bullet and use of pre-emergence herbicide needs to be emphasized in combination with the advanced herbicide technologies for achieving high lint yield and net return. The objective of this study is to examine the advanced herbicide technologies in system approaches to determine the most profitable system throughout growing season within each advanced technology. The study was planted at Texas A&M AgriLife Research Station at Chillicothe, TX on May 10, 2018. The study was designed as a randomized complete block design with three replications. Plot size was four rows by 50 ft with 50 ft buffers between technologies. Three herbicide technology traits utilized for this study were Xtendflex (NG4689B2XF), Enlist (PHY440W3FE), and Glytol/Liberty link (ST5122GLT) cotton cultivars. Target weed species were morning glory [*Ipomoea purpurea* (L.) Roth.] and Palmer amaranth (*Amaranthus palmeri*). Treatments included combinations among 1) with or without pre-emergent herbicide, 2) with or without early post application, 3) with or without late post application, 4) with or without herbicide application with hooded sprayer, and 5) no herbicide application as an untreated check. In-season measurements on weed control (%), lint yield, fiber quality, and preliminary net return will be reported.

Introduction and objectives

Advanced herbicide technologies of cotton (*Gossypium hirsutum* L.) cultivars reduced pressure of weed control for cotton producers. However, these technologies are not the silver bullet and use of pre-emergent herbicide needs to be emphasized in combination with the advanced herbicide technologies for achieving high lint yield and net return. The objective of this study is to examine the advanced herbicide technologies in system approaches to determine the most profitable system throughout growing season within each advanced technology.

Materials and methods

The study was conducted at Texas A&M AgriLife Research Station at Chillicothe, TX on May 10, 2018. Plot size was four rows (40” width) by 50 ft with 50 ft buffers between technologies. Three herbicide technology traits utilized for this study were Xtendflex (X) (NG4689B2XF), Enlist (EN) (PHY440W3FE), and Glytol/Liberty link (GL) (ST5122GLT) cotton cultivars. Target weed species were morning glory [*Ipomoea purpurea* (L.) Roth.] and Palmer amaranth (*Amaranthus palmeri*). Treatments included combinations among 1) with or without pre-emergent herbicide, 2) with or without early post application, 3) with or without late post application, 4) with or without herbicide application with hooded sprayer, and 5) no herbicide application as an untreated check (Table 1). The study was irrigated with in-furrow irrigation. The study was designed as a randomized complete block design with three replications for each herbicide technology. Data were subjected to Analysis of Variance with SAS. Due to the nature of study design without randomization among three herbicide technologies, results are compared within a technology.

Table 1. List of treatment

Trt	Pre	At planting	Early post[1]		Post[2]
X1	Yes[3]	Burndown[4]	Xtend		Xtend
X2	Yes	Burndown	Xtend		Hood[5]
X3	Yes	Burndown	no		Xtend
X4	no	no	Xtend		Xtend
X5	no	no	no		no
GL1	Yes	Burndown	Liberty	Staple	Hood
GL2	Yes	Burndown	Liberty	Staple	no
GL3	Yes	Burndown	Liberty	no	Hood
GL4	no	no	Liberty	no	no
GL5	no	no	no	no	no
EN1	Yes	Burndown	EN[6]		EN
EN2	Yes	Burndown	EN		Hood
EN3	Yes	Burndown	no		EN
EN4	no	no	EN		EN
EN5	no	no	no		no

[1]7/9 for early post and 7/24 for staple, [2]8/14, [3]Caparol, [4]Paraquat, [5]Valor, [6]Enlist duo.

Results and Discussion

2018 growing condition was below average due to winter drought and limited moisture at planting and throughout the growing season (Fig 1.). Pre-emergence application kept fields free from weeds at least for a month after application (Fig. 2). Weed coverage remained low in X1-X2 (2-8%) and EN1-EN2 (0-5%) as compared to X3 (22-30%) and EN3 (18-30%), respectively (Table 2), indicating that the early-post application was important in addition to the pre-emergent herbicide application. Application of Valor in a hooded sprayer was as effective as use of Xtendimax or Enlist duo in the late-post application. It is beneficial to rotate different mode of action to avoid the increase of herbicide resistant weed population. Effect of pre-emergent herbicide was more obvious in X and GL systems than EN system due probably to the lower weed pressure in the field where EN systems were placed as compared to the fields for X and GL systems.

Seed cotton yield is presented in the Table 2. Although it is early to conclude without turnout values, seed cotton yields are higher in the systems, where two post applications were conducted (Table 2). Although system 4 (without pre-emergence) had higher seed cotton yield in all technologies as compared to systems 1-3 (with pre-emergence), weed coverages were higher in system 4 as compared to systems 1-3, increasing weed seed population in soil. Samples will be ginned and fiber quality will be reported.

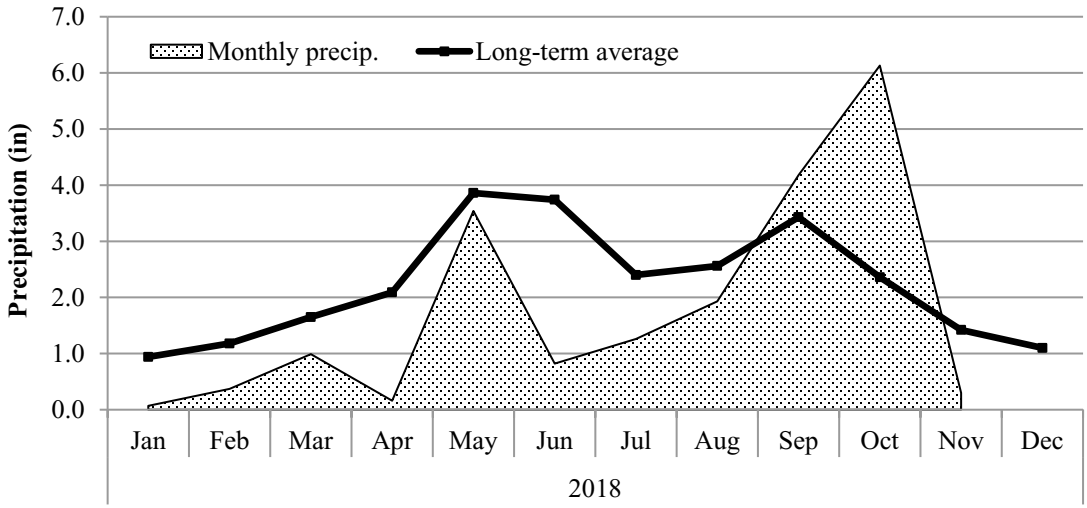

Fig.1. Monthly precipitation

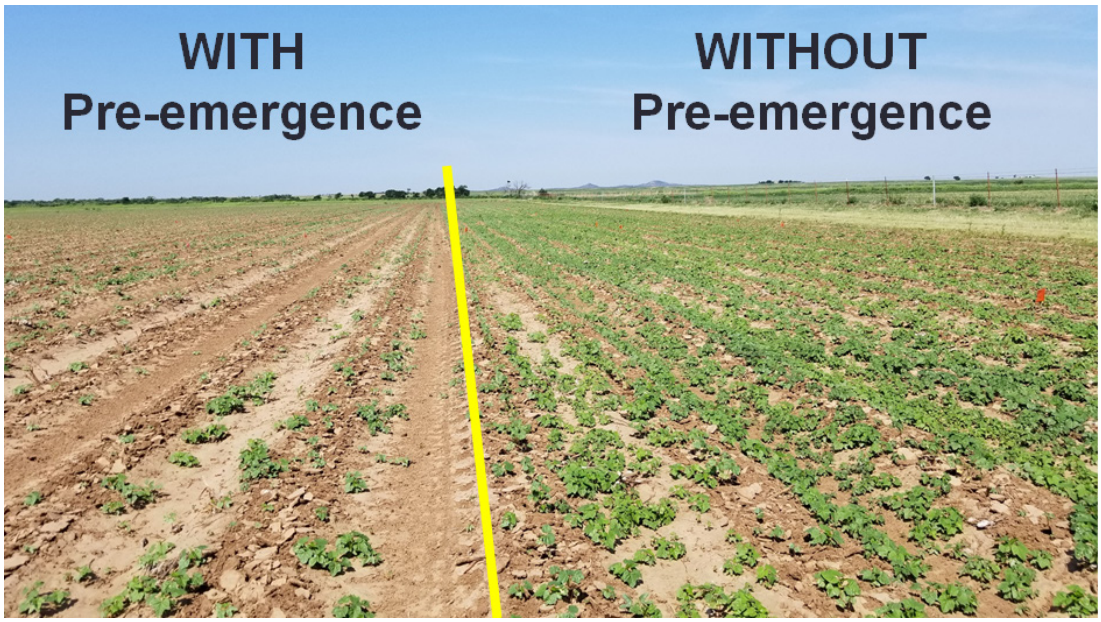

Figure 2. 27 days after pre-emergent herbicide application.

Table 2. %weed coverage and seed cotton yield

Trt	% weed 1 (7/30)	% Weed 2 (8/22)	Seed cotton (lbs/ac)
X1	**2 C**	**3 C**	4434 AB
X2	**8 BC**	**2 C**	4230 AB
X3	**22 BC**	**30 BC**	2474 BC
X4	**25 B**	**47 B**	4700 A
X5	**62 A**	**85 A**	770 C
P	**0.0025**	**0.0036**	0.0073
GL1	**4 B**	**5 C**	2923 A
GL2	**0 B**	**4 C**	2932 A
GL3	**1 B**	**4 C**	3241 A
GL4	**10 B**	**47 B**	2570 AB
GL5	**48 A**	**79 A**	1350 B
P	**<.0001**	**0.0008**	0.0777
EN1	**0 B**	**3 B**	4818 A
EN2	**0 B**	**5 B**	4112 B
EN3	**18 A**	**30 AB**	3746 BC
EN4	**2 B**	**16 B**	4208 AB
EN5	**19 A**	**61 A**	3250 C
P	**0.015**	**0.0232**	0.0045

Values with same upper case letters are not significantly different at $P>0.05$.

Conclusion

Weed control systems were examined for the three advanced herbicide technologies. Preliminary results from the first-year field trial indicated that the pre-emergent herbicide application reduced early-season weed coverage. The most effective system was use of pre-emergent herbicide and two post herbicide applications.

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