Cottonseed Treatment Evaluations in Arizona, 1991

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Abstract

Field experiments were conducted at three locations in Arizona (Maricopa, Marana, Safford) to evaluate 12 cottonseed treatments on Upland cotton (G. hirsutum L.). Stand counts were taken to evaluate the effectiveness of each treatment. Statistical analysis showed no significant differences among the treatments used at the Marana location. Significant differences were found among the treatments used at the Maricopa and Safford locations.

Introduction

With the planting of every cotton (Gossypium spp.) crop there is the potential for the infestation of seedling diseases. Seedling diseases often result in the loss of a satisfactory stand, which is further complicated by the possibility of replanting affected fields, delaying the start of the crop. The occurrence of such soil-borne diseases in a cotton field is often sporadic and varies considerably from season to season due primarily to weather conditions and the sequence of weather events in relation to the growth and development of the cotton plants. In many cases, cotton growers desire adequate protection against seedling diseases and a seed treatment which is applied to the seed prior to planting. In a effort to test a group of cottonseed treatments under field conditions, a project was carried out at three locations in Arizona in 1991 as a continuation of similar projects in 1989 and 1990 (Silvertooth and Malcuit, 1990; Silvertooth and Malcuit, 1991).

Methods

Three field experiments were conducted in 1991 (Table 1) to evaluate the relative effectiveness of a group of cottonseed treatments Upland (G. hirsutum L.) cotton. The treatments shown in Table 2 were used on common lots of DPL 90 (Delta and Pine Land Co. Acala 90) in all experiments with the exception of Marana, in which only treatments 1 through 8 were used. The Safford and Maricopa experiments were dry-planted and watered up. The Marana experiment was planted into moisture and capped. All experiments were arranged as randomized complete block designs with four replications. Plots were four (40 inch) rows wide and 40 feet in length at Marana and Maricopa. Plots were 2 (40 inch rows) and 40 feet in length at Safford. Exactly 200 seeds were planted in each respective treatment row.

Stand counts were made on all plots by counting the number of emerged plants per 40 feet of row. Percent emergence was calculated on the basis of 200 planted seeds. For purposes of statistical analysis, appropriate transformations of percentage data were used for analysis of variance and mean separation procedures (Fishers LSD) according to guidelines put forth by Gomez and Gomez (1984).

Results

The conditions associated with each experimental location is outlined to some extent regarding the initial soil temperatures, heat units (HU, 86/55°F limits) accumulated at planting, and at five day increments after planting in Table 1. The final stand count measurements were taken within 21 days after planting and the HU accumulations at 20 days ranged from 172 to 273. General soil conditions were somewhat cool yet favorable through germination at Safford and Marana with 51 to 60 HU respectively, being accumulated five days after planting. Weather conditions at Maricopa were cool at planting followed by three days of rainfall totaling 0.71 inches of recorded precipitation and several days of cold temperatures, with only 9 HU accumulated five days after planting.

The stand count results are shown in Tables 3 through 5 for all treatments. For each experiment, the basic descriptive statistics are also provided such as the least significant difference (LSD) at the 0.05 probability level, the observed significance level (OSL) or the probability of a greater F value, and the coefficient of variation (CV) expressed as a percent.

At the Marana location, no differences among treatments were found (Table 4). Significant differences were found among treatments at both the Safford and Maricopa locations (Table 3 and 5). Treatment eleven was in the top ranking, and treatments 3 and 5 were in the bottom ranking at both the Safford and Maricopa locations. Treatment 12 performed relatively well at both Maricopa and Safford. There were no other clear similarities between the two tests.

The Maricopa location produced the lowest emergence levels of the three sites, apparently due to the adverse weather conditions. The low emergence levels were in large part due to soil crusting, and poor germination, following the rainfall and cold temperatures shortly after planting. Seedling diseases, which can be controlled with the type of seed treatments used in this experiment, are more often a problem when rainfall, and cold temperatures follow shortly after emergence; about 7 to 10 days after planting.

Results such as these provide some information to cotton growers concerning cottonseed treatments and their protective ability at various locations. However, none of the experiments described in 1991 were subject to distinct disease pressure from soil-borne organisms. Experiments such as these provide a general basis for evaluation and are randomly dependent upon weather patterns and the possible development of seedling disease pressure. Such an approach requires a repeatable, long term project conducted over the course of several years, at multiple locations similar to these 1991 studies.

Acknowledgement

The authors gratefully acknowledge the support provided by Gustafson, Inc. and the Wilbur-Ellis Co., and also the valuable assistance provided by the very capable personnel at the Maricopa, Marana, and Safford Agricultural Centers of the University of Arizona.

References

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Table 1. Seed treatment experimental University of Arizona Agricultural Center locations and conditions in Arizona, 1991.

Location	Planting Date	Soil Temp.[§]	Accumulated HU				
			Planting*	5 d**	10 d	15 d	20 d
		-°F-	(86/55°F HU)				
Maricopa	3/25/91	59	318	9	58	132	172
Marana	4/18/91	67	542	60	110	170	253
Safford	4/23/91	69	504	51	109	186	273

[§]Soil temperature at the depth of seed placement, at the time of planting.
* HU accumulated since Jan. 1 at planting.
**HU accumulated 5, 10, 15 and 20 days after planting.

Table 2. Treatments used in the 1991 seed treatment evaluation experiments in Arizona. *

Treatment	Formulation	Rates ------fluid oz./CWT-----
1	untreated control	---
2	Vitavax PCNB	6.0
	Apron FL	0.75
3	Vitavax PCNB	6.0
	Apron FL	0.75
	Baytan 30 FL	0.75
4	Vitavax PCNB	6.0
	Apron FL	0.75
	Baytan 30 FL	2.0
5	GUS FR19	6.0
	Apron FL	0.75
6	GUS FR19	12.0
	Apron FL	0.75
7	GUS FB11	1.0
	GUS FG14	3.0
	Apron FL	0.75
8	RTU-Vitavax Thiram	11.0
	Apron FL	0.75
	Baytan 30	1.0
9	Nu Flow ND	7.5
10	Nu Flow ND	7.5
	Apron TL	2.0
11	Nusan 30 EC	2.25
	Apron TL	2.0
	Weco 62864	3.0
12	Nusan 30 EC	2.25
	Weco 62864	3.0
13	NuFlow ND	7.5
	Orthene 80	8.0
14	untreated control	---

* All materials applied in a slurry at a rate of 800 cc/CWT on a common lot of DPL-Acala 90.

Table 3. Percent emergence means for cottonseed treatments, Maricopa, 1991.

Treatment	Mean Emergence per Row
	---------- % ----------
12	50 A*
11	46 AB
10	45 AB
9	41 BC
13	41 BC
14	41 BC
4	36 CD
6	35 CD
7	34 CD
2	34 D
1	33 D
8	33 D
3	33 DE
5	26 E
LSD 0.05	7.1
OSL§	0.0001
CV(%)	13

*Means followed by the same letter within the column are not significantly different (P≤0.05) according to pairwise comparisons using a Fisher's LSD.

§OSL, observed significance level (probability of a greater F value).

Table 4. Percent emergence means for cottonseed treatments, Marana, 1991.

Treatment	Mean Emergence per Row
	---------- % ----------
1	71
2	68
3	68
4	67
5	65
6	69
7	68
8	71
LSD 0.05	NS
OSL[§]	0.26
CV(%)	4.4

[§]OSL, observed significance level (probability of a greater F value).

Table 5. Percent emergence means for cottonseed treatments, Safford, 1991.

Treatment	Mean Emergence per Row
	---------- % ----------
11	83 A*
13	74 AB
6	66 BC
12	66 BC
9	64 BCD
4	63 BCD
8	60 BCD
10	60 BCD
7	59 BCD
1	58 BCD
2	57 CD
14	56 CD
3	54 CD
5	49 D
LSD 0.05	16.5
OSL§	0.03
CV(%)	19

*Means followed by the same letter within the column are not significantly different ($P \leq 0.05$) according to pairwise comparisons using a Fisher's LSD.

§OSL, observed significance level (probability of a greater F value).