

1975 COTTON HERBICIDES TESTS

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Cotton growers now have a relatively wide selection of herbicides for use as preplant incorporated treatments. These include:

<u>Trade Name</u>	<u>Common Name</u>
Amex 820	butralin
Basalin	fluchloralin*
Cobex	dinitramine
Prowl	penoxalin
Treflan	trifluralin
Tolban	profluralin
None	USB 3153*

*Not registered for use at this time

These herbicides can be described as "yellow herbicides." They all require soil incorporation. The herbicide manufacturers suggest that the herbicides should be disced in prior to planting. These herbicides have all provided preemergence control of annual grass weeds but vary in their effectiveness for control of annual broadleaf weeds. The "yellow herbicides" also vary in their effect on cotton seedlings. Selectivity of these herbicides in cotton is dependent upon many factors. They include:

1. Relative tolerance of cotton to the herbicide. All "yellow herbicides" tend to restrict the development of secondary roots on cotton seedlings. Where the "yellow herbicide" has been shown to be more injurious to cotton seedlings, greater care must be taken in the selection of the proper application rate. Application rates must be adjusted to provide adequate weed control with minimum effects on cotton.
2. Depth of incorporation. The method of incorporation used to mix the herbicide into the soil will have an important effect on selectivity. Incorporation by discing three or four inches deep will help insure good weed control but may place the herbicide several inches below the cotton seed. If herbicide incorporation is too shallow, the cotton seed may be planted in a herbicide-free area but poor weed control in the seed row may result.
3. Method of planting. Most cotton in Arizona is planted on beds into moist soil under a dry mulch. The cultural practices used by the grower to prepare this seedbed will affect the height of the bed at planting time and therefore the amount of herbicide beneath the cotton seedling. The method and depth of herbicide incorporation as well as the method of planting should help determine the "yellow herbicide" selected by the grower.
4. Climate conditions. When temperatures are relatively warm during the planting season, cotton seedlings grow rapidly and extend their roots into untreated soil. Little, if any, effect is visible on the cotton seedlings. When temperatures are relatively cold during the planting season, the cotton seedlings grow more slowly and the roots penetrate the herbicide-treated area less rapidly. Cotton seedlings may be severely stunted. Where seedling diseases become a problem, stand loss will be increased by the activity of the herbicides.

the relative importance of selectivity with preplant "yellow herbicides"

The effect of "yellow herbicides" on early season stand establishment has been studied for over 10 years. Each year some herbicides will have more effect on cotton seedlings than others. Evaluations made during March through June have often shown significant differences between stand and cotton growth due to herbicide treatment. These differences generally disappear by July and no yield differences can be measured at harvest time. The cotton plant is grown over a relatively long season and can compensate for early season differences in plant size and stand densities.

Differences in yield due to preplant herbicide treatments can occur in the field under certain conditions. Where cotton stands are reduced by preplant treatments and weeds are not controlled,

yields can be reduced. On the Experiment Station, good cultural practices are used to help control early season weeds and a broadleaf herbicide such as prometryne (Caparol) or diuron (Karmex) is used at layby to help control late season weeds. If the grower chooses to use only a preplant "yellow herbicide" and stands are seriously reduced, weeds may compete successfully for some of the cotton yield.

Early season stunting of cotton may affect cotton production in ways other than yield. When early season development of the cotton plant is delayed, less soil can be thrown toward the seed row during the first and second cultivation. Cotton stunted early in the season may shade over the areas between seed rows one or two weeks later in the season. Therefore, slower growing cotton may be more difficult to manage and slower to mature.

1975 Trials

During 1975 cotton preplant herbicide trials were established in Maricopa, Pinal, and Yuma counties to evaluate "yellow herbicides" alone and in combination with Caparol. Trials were established on the farms of:

<u>Cooperator</u>	<u>Location</u>
Twain Black	Buckeye
Bruce Church Ranches	Parker
Bob Moore	Beardsley
John Terry	Coolidge
Marvin Wuertz	Casa Grande

The herbicides were applied during February through March with a pull-type sprayer, using 25 GPA of water, covering four beds at a time. Herbicide application rates were adjusted to the soil type at each location. Treflan, Prowl, Tolban and Basalin were applied at the same rates because of similar label rates. These rates varied from 0.5 lb/A on light, sandy soil to 0.75 lb/A on the medium textured soil. Cobex and USB 3153 were applied at rates from 0.3 to 0.5 lb/A. Amex 820 was always applied at 1.5 lb/A. Caparol rates varied from 0.8 to 1.2 lb/A. Plot size was four beds wide and about 200 feet long replicated three times. Methods of incorporation used were:

On flat - Herbicides applied to soil after discing and floating and prior to bedding up for preplant irrigation. Herbicides were incorporated by the furrowing out process and seedbed preparation.

On flat disc - Herbicides applied to soil after discing and floating. Herbicides were disced in two to four inches deep prior to bedding up for preplant irrigation. Herbicides incorporated by discing, furrowing out process, and seedbed preparation.

Each grower used his "normal" cultural practices to grow the crop. Planting dates, soil type and irrigation water quality varied from location to location. All were planted in the spring on single row, 38- to 40-inch beds under a dry mulch.

Climatic conditions

The 1975 spring growing season was very poor for cotton development. Temperatures were cooler than normal and some rainfall occurred. Cotton seedling growth was slow. The test established at the Bruce Church Ranch at Parker was lost due to overspraying with another herbicide. At all other locations, no replanting was required.

Stand and stunt evaluations

Stand counts were made on 10 feet of row at six locations in each test. Cotton stunting evaluations were made of each plot and compared to the untreated check. Evaluations were made in May and June until cotton began rapid growth and no further plant mortality occurred. The data reported on stands was an average of the last evaluations made in June. After June the cotton plants made rapid growth and no differences in plant growth were observable.

Weed control evaluations

There were infestations of annual weeds in each test area. Weed pressure was very heavy at the Twain Black location early in the season. The weeds were common lambsquarters and nettleleaf goosefoot. All herbicide treatments and methods of application successfully controlled these weeds. In other locations weeds were widely scattered and evaluations suitable for analysis could not be made. All the

fields with the exception of Twain Black's were treated with a layby application of Caparol by the grower, making late season weed control evaluation impossible.

Effect of "yellow herbicides" on cotton stands and stunting. (Data Table 1)

No discing:

Where the yellow herbicides were not disced in, no effect on number of cotton plants per foot of row was observed. Treflan, Cobex, and Basalin treatments were stunted more than Amex 820, Prowl and the untreated check.

Discing:

Discing increased the effect of most of the yellow herbicides upon cotton stands. All herbicide treatments reduced cotton stands except Amex 820, Tolban, and the untreated check. However, cotton stands were adequate in all treatments for normal cotton production. Treflan, Cobex, USB 3153, and Basalin stunted cotton more than other treatments. Tolban was intermediate in its stunting effect upon cotton.

Effect of yellow herbicides and Caparol on cotton stands and stunting. (Data Table 2)

No discing:

No treatment affected cotton stands. All herbicide treatments stunted cotton seedlings except Prowl and Amex 820 plus Caparol.

Discing:

Where the combination treatments were used, cotton stands were reduced by all treatments except Amex 820 plus Caparol. Cotton stands were adequate in all treatments. The combination treatments produced significant stunting with all herbicides.

Conclusions from these tests

Where the "yellow herbicides" were not disced into the soil, no loss of stand occurred with any treatment. Where the herbicides were disced into the soil, some stand loss occurred with all treatments except Amex 820 and Tolban.

Where "yellow herbicides" were combined with Caparol, no significant loss of stand occurred if the herbicides were not disced in prior to bedding. Cotton stands were affected in some degree by all treatments when the "yellow herbicides" plus Caparol were disced into the soil. Stunting of cotton was increased for Prowl, Tolban and Amex 820 when applied with Caparol. Caparol plus the "yellow herbicides" did affect early season growth of cotton differently than the "yellow herbicides" alone. Cotton seedlings were not only stunted but those plants treated with Caparol and the "yellow herbicides" were often chlorotic with some leaf burn. This chlorosis was most evident following the first post-emergence irrigation. The chlorosis was temporary and was outgrown in all plots by June. Caparol did not seriously increase stand loss with any methods of application or with any "yellow herbicide." In these tests, Treflan, Cobex, Basalin, and USB 3153 were consistently less selective on cotton seedlings. Tolban was intermediate while Amex 820 and Prowl were the most selective herbicides tested.

Table 1. Effect of Yellow Herbicide on Cotton Stand and Percent Stunting by June, 1975 Prior to Bloom at Four Locations

Herbicide	No Discing		Discing	
	Plants/10 ft row	% stunt	Plants/10 ft row	% stunt
Treflan	26.6 a*	21.0 c	20.8 c	16.5 c
Cobex	26.9 a	18.7 c	23.5 b	17.0 c
Tolban	27.6 a	13.0 abc	26.6 ab	9.0 b
Prowl	26.6 a	1.0 a	24.7 b	2.0 a
Amex 820	26.1 a	3.7 a	27.5 a	1.7 a
USB 3153	22.5 a	16.0 bc	22.4 bc	16.7 c
Basalin	24.1 a	19.0 c	22.8 bc	16.7 c
Check	27.5 a	0 a	27.8 a	0 a

*Means followed with the same letter are not significantly different at the 0.05 level.

Plants/10 ft row - The average number of plants in 10 ft of row at six locations in each of four test fields.

% Stunt - 0 = no effect

100 = all plants dead

Table 2. Effect of Yellow Herbicides and Caparol on Cotton Stand and Percent Stunting by June, 1975 Prior to Bloom

Herbicide	No Discing		Discing	
	Plants/10 ft row	% stunted	Plants/10 ft row	% stunted
Treflan + Caparol	24.8*	19.3 d	21.5 e	16.7 c
Cobex + Caparol	24.7 a	16.7 cd	25.7 bc	17.7 c
Tolban + Caparol	23.2 a	21.3 d	24.6 cd	16.0 bc
Prowl + Caparol	25.0 a	10.3 ab	23.8 d	10.2 b
Amex 820 + Caparol	25.5 a	11.7 abc	26.6 ab	8.5 b
Check	28.9 a	0 a	27.1 a	0 a

*Means followed with the same letter are not significantly different at the 0.05 level.

Plants/10 ft row - The average number of plants in 10 ft of row at six locations in each of four test fields.

% Stunt - 0 = no effect

100 = all plants dead

TIME OF ROUNDUP OVER-THE-TOP OF COTTON

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Planted: April, in moist soil, but irrigated April 24 to improve stand.

Variety: Deltapine 16.

Soil: Sand 31%, silt 41%, clay 28%, organic matter 1%.

Treated: Treflan (0.5 lb/A) was disced into the soil February 18 before furrowing for the preplanting irrigation. Karmex (1 lb/A) was applied June 5 as a directed spray covering the furrow and base of cotton plants. The test was cultivated three times with a rolling cultivator. Over-the-top applications of 1 oz/A of Roundup in 40 gpa of water were made on May 14, June 4, June 24, July 15, August 6, August 27, and September 17 when cotton averaged 4, 7, 16, 30, 50, 56, and 70 inches tall.

Harvested: By machine in November.

Plots: Four rows - 41 ft. long - four replications.

Date of treatment	Boll components ¹			Fiber properties ¹			Yield of seed cotton lb/A ²
	Weight grams	Percent lint	Seed per boll	Length inches UHM	Strength Breaker	Fineness Micro.	
Untreated	6.0	36	34	1.15	3.4	4.4	2,300 a
May 14	6.0	36	34	1.15	3.3	4.2	2,320 a
June 4	6.0	36	34	1.15	3.4	4.4	2,280 a
June 24	5.9	37	35	1.13	3.3	4.6	2,530 a
July 15	5.8	37	34	1.14	3.3	4.5	2,530 a
August 6	6.0	37	34	1.13	3.3	4.4	2,440 a
August 27	6.0	37	34	1.15	3.3	4.4	2,360 a
September 17	5.9	37	34	1.12	3.3	4.5	2,470 a

¹Based on four 10-boll samples before harvest.

²Values followed by the same letter are not significantly different.