

# Weed Control By Flame Cultivation

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Excellent control of annual weeds in cotton has been obtained by supplementing regular cultivation with the application of flame to the drill row. Counts of annual broadleaf weeds — such as morning glory, careless weed, and ground cherry — indicate that flaming reduced the weed population in the drill row by 90 percent.

A late-season count of annual water grass population indicated that four flamings reduced the infestation by 35 to 40 percent. Also, the water grass in flamed rows was not as dense and was smaller than in the unflamed check rows.

## Cotton Yields Not Reduced

Yields of cotton have not been reduced by flame cultivation in 2 years testing at Marana. A slight improvement of grade was noted for machine picked cotton from flamed plots in the 1953 tests over unflamed check plots where weed infestations

were light. Heavy weed infestations may reduce cotton grades.

Flame is applied, not to burn out weeds, but to cause the liquid in plant cells to expand and rupture the cell walls and thus kill the weeds. This principle works best on small annual-weed seedlings. Larger and more mature weeds require more intense heat and are difficult to kill with flaming. Cotton plants should be 8 to 10 inches tall and have a stem about  $\frac{1}{4}$  inch in diameter to withstand the heat of flaming.

Flaming will not eradicate large established weeds, especially Johnson grass. When established Johnson grass has been held down by hoeing until flaming can be started, weekly flamings with close regular cultivation may retard the growth until lay-by time. After lay-by, the Johnson grass recovers and grows rapidly.

Flaming after the hoed Johnson grass has dried, may result in grass fires that will burn the cotton plants. The more dry grass present, the more damaging grass fires become.

Proper application of the flame is essential for good results. Two flat burners staggered on opposite sides of the row were used to apply the

flame in the experimental plots at Marana. Each burner was set at an angle of 45 degrees from the horizontal. The flame end of the burner was 6 to 8 inches above the bed and 9 to 11 inches from the cotton plant. With this setting, the flame was 10 to 12 inches long and struck the bed 2 to 3 inches from the cotton plant.

Usually final adjustments are made in the field to get proper flame position. The few plants burned while stopping to make field adjustments is less damaging than improper application with poor results over a large acreage.

## 30 Pounds Pressure

The burners were operated with 30 pounds gas pressure and with a tractor speed of 3 mph. Increasing the speed of operation will decrease heat intensity and may be helpful at time of first flaming in small cotton. Occasionally, flaming caused yellowing of the cotton leaves which disappeared within a day without harmful effects. Small weeds generally show the effect of flaming within a few hours. The best time to apply flaming to the drill row is 7 to 10 days after an irrigation when weed seedlings first appeared, but before they had made much growth.

Two flamings between irrigations spaced a week apart were found helpful in controlling a heavy morning glory infestation encountered in the 1952 tests. Similar flaming schedules would require 4 to 8 flamings before lay-by time. Flame cultivation can continue until cotton bolls have opened.

Present flame cultivators use a butane-propane fuel because it burns clean with intense heat. Four and one-half gallons of fuel per acre were used for each flaming while operating at 3 mph. and 30 pounds gas pressure.

Fuel for flaming costs 70 to 72 cents per acre at these rates. If an allowance of 18 cents an acre is made for the overhead cost of the flame equipment, the fuel and equipment costs will amount to approximately 90 cents per acre for each flaming, exclusive of charges for tractor and operator.

Flame cultivation can be applied simultaneously with regular cultivation or as a separate operation. Simultaneous application requires a slight modification of the rear cultivator gangs, but has the advantages of fewer trips through the field and a saving in operating costs.

Two-row flame cultivator and regular cultivator mounted on tractor for simultaneous cultivation and flaming.

