

Control of Annual Grasses in Sugar Beets

L. E. WARREN¹

Weeds have presented to the sugar beet grower a problem which has been attacked for many years by cultivation and hand hoeing. Hoeing often has proved to be unreasonably expensive and sometimes unreliable. Also, the desirability of cultivation, for other than weed control purposes, is questionable. However, these have been the only means known to eliminate or reduce the harmful weed population between and in the rows.

Recently beet growers have made increasing use of general contact chemicals for weed control as pre-emergence sprays to kill weeds which emerge ahead of the beets, as well as selective sprays to kill the weeds in growing beets. These both have been valuable, but since later germinating weeds usually reduce the benefit of pre-emergence treatments, and selective sprays are not effective on grasses, it is still necessary to find a control of annual grasses in growing beets.

Grasses, as well as other weeds, not only compete with the beets for nutrients, water and sunlight, but interfere with harvest operations. Considerable expense often has been incurred by the grower in removing these weeds only to have the field reinfested by harvest time. It is conceivable that grasses could be eliminated from sugar beets by (1) a selective chemical which would not harm the beets, or (2) a general contact spray, placed so that the beets would not be injured, completely covering the soil surface between and in the rows.

A New Selective Herbicide

A newly introduced grass killer called STCA (sodium trichloroacetate²) promises to aid considerably in our fight against annual grasses. This chemical, which is easily soluble in water, attacks the grasses through their roots, and, therefore, must be present in the soil to be effective. At the rates needed STCA will not injure sugar beets at any growth stage under conditions tested so far whether used as an overall spray or placed below the leaves.

Trials last summer were conducted at the Dennis Leary ranch at Ryde, the Gene Winters ranch at Woodland, and others in cooperation with the Spreckels Sugar Company. Application of STCA was made by ground sprayer at intervals of a few hours to several days prior to either rain, sprinkling, or furrow irrigation. The watergrass, which was the predominant weed in these fields, was in all growth stages. STCA up to 16 pounds per acre was applied to all stages of sugar beets from before emergence to nearly full grown.

¹ Agricultural Research Specialist, Dow Chemical Company.

² Rates per acre will refer to acid equivalent, not marketed product.

Best results were obtained in these tests with 6 to 8 pounds of STCA per acre applied before germination of the grasses or while they are less than 2" high, and when irrigation followed application within 3 to 4 days. A slight marginal leaf burn from overall sprays at higher temperatures was the only observable effect on the beets. These trials were conducted on



Figure 1.—Late-emerging watergrass covered the ground under nearly mature beet foliage. This is a typical condition, and can ruin a beet crop unless controlled.

medium textured soils; because of leaching, lighter soils may require somewhat more than 6 to 8 pounds of chemical, but good control should be obtained with these dosages on heavier soil types.

Shielded Spray Developments

The culture of beets, including their response to chemicals, has shown them to be very hardy plants after they have reached the 5- to 6-leaf stage. The leaves may be severely damaged by cultivation, rolling or sprays, but the

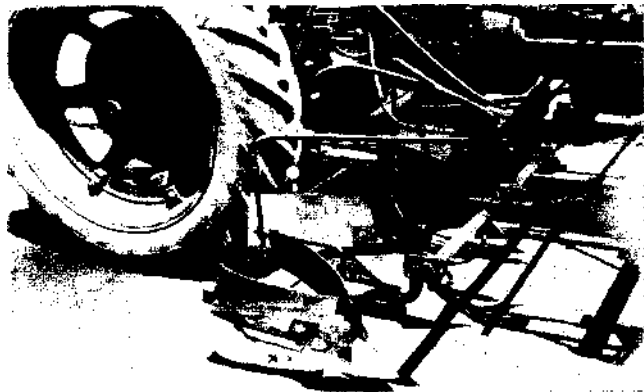


Figure 2.—Shielded Spraying of late-emerging watergrass was accomplished with this combination of winged furrowing shovels and spray nozzles.

crop recovers quickly, with no effect on the root development. Because of this plans were made to test the effect of directing a contact chemical spray to cover the complete soil surface below the beet leaves.

In other phases of the trials mentioned previously, it was learned that beets in good growing condition had to be about 14" high before they would stand a contact spray which could kill young grasses. Therefore, shields were used to protect the younger beets. With these shields, nearly a direct spray was necessary to cause more than a leaf burn on the crop after the 5- to 6-leaf stage.

In a field of nearly full grown beets near Davis, the following treatments per acre were applied to a thick stand of very young watergrass. (See Fig. 1) .

1 qt. of Dow General³ in 40 gallons of diesel oil (no water)

1 qt. of Dow General in 25 gallons of diesel oil added to 25 gallons of water (plus wetting agent)

The sprays were placed so they overlapped across the rows beneath the leaves.

³ Dinitro sec-butyl phenol 55%.

The Dow General in oil alone seemed slightly superior to the emulsion spray, but both proved effective.

The equipment to apply this test was arranged by Austin Armer of Spreckels Sugar Company. Shields to lift the beet leaves above the spray consisted of 10" ditching shovels fitted with 24" strips of belting held against the beet leaves by pieces of spring steel on the lower side. The nozzles were suspended on special pipe supports behind these shields for adequate protection. Both shields and nozzle supports were attached to the center tool

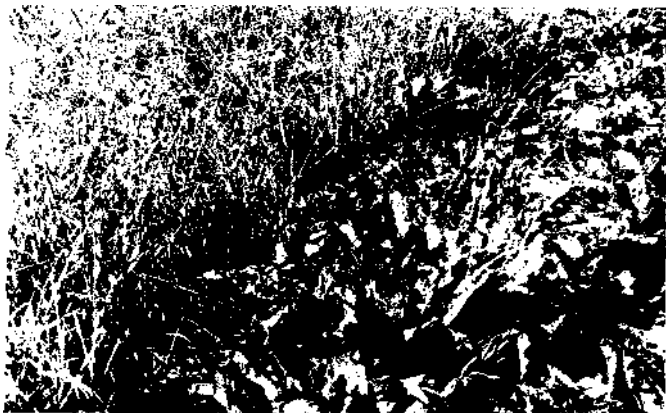


Figure 3. Striking evidence of the effectiveness of shielded spraying of late-emerging water grass (left—untreated; right—shield-sprayed with fortified oil).

bar of a Farmall "M" tractor, and the power for the spraying operation was supplied by an Essick air power sprayer towed behind. The nozzles were at a height of 11" to 13" above the ground and directed downward, but placed so the edges of the fans overlapped to cover the bases of the beets. In other trials, the writer used duckfeet weeders with steel straps welded to extend back of the nozzles and to lift the leaves sufficiently. In still others, where the beets were younger, the shields were vertical and set to run as close to the row as possible, but yet provide adequate protection.

A grower can use any arrangement he has available which can perform the operation. The entire set-up can be mounted on the tractor if desired, using a 50-gallon drum for the tank, and the power take-off to operate the pump. Shields can be attached to the tool bar to coincide with the planter rows, as the cultivator does now.

For best control the grasses should be sprayed as soon as possible after emergence, but before they are 2" high. The weed control program in sugar beets could include STCA properly timed to the germination of the grass and irrigation at any time during the season, followed if necessary by another STCA spray or a contact chemical treatment.

Either the general contact or STCA treatment or both can be adapted easily to the normal culture of sugar beets with substantial savings. Naturally the present costs of producing a crop must be reduced by these new methods to make them attractive. Some of the costs involved are listed below in amounts per acre per treatment.

Treatment per acre	Cost per acre
1 qt. Dow General in 25 to 50 gal. Diesel Oil	\$5.00 to \$7.00
6 to 8 pounds STCA ⁴	4.00 to 5.00

Other advantages which may be realized from this program are:

1. Replaces hand labor with a more dependable operation.
2. Eliminates need for working ground while wet.
3. Prevents bringing more weed seeds to soil surface during season.
4. Does not break down beds as with cultivation.
5. Aids in reducing total weed seed population in the soil.

As with any new program, if proper caution is not observed, either the chemical may fail or cause too much injury. In view of these possibilities and variations in local responses, it is suggested that only trial acreages be treated. In this way, the best use of the chemicals can be learned for each situation, and a good foundation will be laid for well-directed action the following year.

⁴STCA can be applied with the above contact chemicals but the burn on the leaves and crown buds of the sugar beets will be increased.