

A REVIEW OF CHEMICAL WEED CONTROL METHODS AND MATERIALS
USED IN THE NORTHERN OHIO SUGAR COMPANY AREA IN
NORTHWESTERN OHIO AND SOUTHEASTERN MICHIGAN

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The many benefits resulting from reduced weed populations in sugar beets, especially in the rows at the beet emergence and seedling stage, is well known to all of us.

These benefits have been made more possible in the past few years by the use of chemicals which will kill weeds in the germination, emergence and seedling stages.

Since 1958, 33,736 acres of sugar beets have been treated in the Northern Ohio Sugar Company area with Endothal, TCA, or combinations of these two chemicals. Last year a total of 9,617 acres or 40% of the planted acreage was treated with herbicides applied either as pre-emergence or post-emergence treatments.

Endothal and TCA were both introduced for possible use on sugar beets as pre-emergence applications in the late 1950s. It was immediately found that Endothal gave acceptable control of many weed species, especially smartweeds. TCA exhibited excellent control of grass-type plants and also gave indications of killing certain broadleaf weeds.

Numerous weed control experiments were conducted on sugar beets between 1958 and 1960 in our eastern beet growing region, using many recently developed herbicides. Also, included in tests were trials in which these chemicals were incorporated into the soil with disks or harrows or sprayed onto the beet and weed foliage in post-emergence fashion.

The results of all these tests conducted through the spring of 1960 convinced us that our recommendation to farmers for 1961 should be the use of Endothal plus TCA as a spray mixture or granular Endothal for granular applications for pre-emergence use. It was also recommended at this time that Endothal be used as a post-emergence treatment for the exclusive control of smartweed, and that Dalapon be used for post-emergence control of grasses.

These same recommendations were made for 1962 except that Tillam, an analog of EPTC, was suggested for trial use. Very little Tillam was used, however, since it had to be incorporated into the soil, preferably as a band treatment for cost reduction before the planting operation.

As more acreage was treated with Endothal in 1959 and 1960, the fact soon emerged that this chemical varied quite considerably in weed control response. Major factors causing this varied

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response were soil textures, temperatures, moisture levels and organic matter contents, and variability in rates of the chemical applied.

Results todate using Endothal plus TCA or the combination thereof, as a pre-emergence spray treatment have been outstanding. It was noted in many fields in the spring of 1962 that there was a reduction of 80-90% of the weed species lambsquarters, pigweed, ragweed, and velvet leaf, and 90-100% of smartweed and grass in the treated areas.

Also controlled in a quite satisfactory manner was yellow nutgrass, a tough-to-eradicate perennial grass.

That the herbicide resulted in a higher percentage of weed kill and broader spectrum of weeds controlled was very evident. It also appeared that the combination of Endothal and TCA persisted longer in the soil giving a longer residual action against germinating weeds.

It has been found, in general, that the best and most consistent control is obtained on those soils which have a light, medium or medium-heavy texture in the A horizon or surface soil. Unless a particular farmer on the very heavy soils has received adequate control in the past, the use of the herbicide is not generally recommended on those clay-type soils.

Post-emergence treatments with Endothal have been exceptionally good and the results are immediately seen, but the luster of their performances is tempered by the fact that the chemical is generally used to "save" a beet crop which has become the victim of large, fast-growing smartweed.

The ideal use of the chemical, that is, immediately after emergence of the beets and weeds, is seldom accomplished at this particular stage of growth. A few other weed species can be stunted or killed during this ideal stage, thus facilitating the cultivation and stand adjustment operations. This, also, would reduce the weed competition factor at an earlier date. Many reasons and causes are offered, but this lack of timeliness in the post-emergence applications of the chemical is, as I see it, the major drawback in recommending this type of program at the present time.

Very few acres have been sprayed with Dalapon but due to the delayed action of the chemical, the timeliness of operations is usually impeded.

The methods by which these chemicals have been applied have not particularly varied since the introduction of the herbicides.

Pre-emergence sprays are applied during the planting operation by flat-pattern nozzles attached on the rear of the planter

units. One or generally two, 50-gallon drums are mounted on the tractor and supply the herbicide solution at the rate of 10 gallons per acre in 6-inch bands. The amount of chemical applied per acre is usually best determined by trial applications in a given locality on a particular soil texture. Once this is determined, injury to germinating seeds or beet seedlings is seldom observed.

The use of granular materials did increase due to the ease of application and handling, but is currently hampered for lack of a better chemical than Endothal. The variability of response with this chemical is still with us today regardless of the formulation, liquid or dry. Faulty application rates of the granular material have resulted in slightly reduced emergence of beets.

Post-emergence applications of Endothal are usually applied overall at the recommended rate of $1\frac{1}{2}$ # of active ingredient per acre, since less than this will not insure a good smartweed kill. At this particular rate, the cost for an overall application exceeds the cost of spraying pre-emergence in 6 inch bands. The necessity for spraying overall is generally due to the row of beets being obscured by four weed growth and band applications are not too accurate.

Occasionally, the beet seedlings are stunted for a few days and the leaf margins twisted, but they recover in a relatively short time and yields are not apparently affected.

The fieldman, with his knowledge of each farmer's management practices and capabilities, the past performances of the chemicals, the soils in his district and the principles of application of herbicides, is the most important individual in the accomplishment of successful chemical weed control in sugar beets.

In reviewing and establishing our program for 1963, we will continue to recommend Endothal plus TCA as the pre-emergence herbicide. There is still much room for improvement in increasing the number of acres sprayed upon which the chemical will give a satisfactory performance of weed control. Granular Endothal will be recommended but not "pushed" as a satisfactory chemical for pre-emergence control.

Endothal will continue to be suggested for post-emergence spraying with emphasis on timeliness of application.

In addition to our regular type of weed control trials this spring, we plan to use a 4-row power incorporation device which will thoroughly mix a chemical or chemical combination into the soil in bands to a depth of $1-1\frac{1}{2}$ inches. It is anticipated that this procedure will reflect in increased and more reliable weed control.