

# Some New Ideas for Weed Control

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The Beet Sugar Development Foundation is entering its fifth year of cooperative study with the mechanical engineering section of the Colorado A & M Agricultural Experiment Station, Fort Collins, Colorado. Various mechanical implements have been used for weed control in the sugar beet crop during these past five years, the most popular being the tine weeder which has been used commercially on large acreages the past three years. This single machine has considerable merit. It should be recognized also that it does have limitations and that caution in its use should be exercised. These favorable and unfavorable factors of the tine weeder will not be discussed in this paper, as they have been covered fully in previous papers.

Within the past year several new implements have been used, some being new tools while others fall in the category of being new to the beet crop, having been used previously with considerable success on other row crops such as beans and corn. A discussion of these recent innovations is the scope of this paper. All of these tools require more experimental use; in fact, one has not yet been used in a sugar beet field.

In appraising new implements, simplicity in design ranks very high on the score card. Simplicity, in turn, makes possible a lower manufacturing cost, making the new item more attractive to the grower, the ultimate user. While simplicity is highly desirable, one must not hold it as the only criteria. The simple tools already in use fall short of giving the desired results. It seems reasonable, therefore, that one should also weigh the merits of the more complex machines carefully. The more complex machine becomes a simple machine in popular opinion if the results are highly satisfactory.

The first machine to be considered is the cycloid weeder developed by the Colorado A & M Experiment Station. This unique device makes use of flexible tines arranged as two inverted baskets with the inside tines of each basket slightly overlapping. The machine is run so as to be directly over the row at the point where the two inverted baskets overlap. A ground-driven wheel furnishes the power. The cycloid action of the tines produces a rather gentle weeding over the beet row, increasing its cultivation toward the row center. This machine offers much possibility for early cultivation when the beets are in the 2- to 4-leaf stage. At this time the small emerging weeds can be destroyed in the beet row without injury to the beet. The crustbreaking potential of this machine should not be overlooked.

Another machine, perhaps equally efficient in early cultivation, is one patterned after a sugar cane weeder. Side-delivery rake tines were set perpendicular near the periphery of a 14" circular plate at three-inch intervals. Two of these plates are driven by the same wheel, making it a two-row unit. Experimentally it has been built as an adaptation to the Milton blocker. Plates can be adjusted to different angles over the row, thereby increasing or decreasing the severity of cultivation. Different size rake tines were also used, the heavier tines giving a more severe cultivation suitable to later cultivations. This tool was designed and built by the Beet Sugar Development Foundation.

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It should be reemphasized here that all beet blockers are likewise weed removal tools. The percent of weeds removed approaches the portion of the beet row removed by the blocker. Several of these blockers have already been discussed, therefore will not be included here. The weeder attachments on these blockers warrant some attention. Replacing the tines with short blades or placing short blades on the end of the tine has been tried this past year with promising results. In addition to the many Dixie adaptations two additional ones were made by the Foundation, the first for the B & P blocker consisting of 18 small knives on a disc-shaped wheel. Cotton growers have taken to this innovation and a large number of the machines have been sold for cotton fields. The second modification has been for the Milton blocker, replacing the conventional blocker wheel with the small knife wheel.

Rotary hoes have been used in beet fields in previous years as crust breakers and to give light cultivations. The more recent larger wheels made for cotton and corn offer great possibility if run with the curve of the tooth turning into the ground. Speeds govern the severity of the cultivation; the faster the travel the more dirt is moved. Gangs of rotary hoe wheels can be set abreast and run over the beet row after the beets have reached the four-leaf stage. It is of interest to know that in the cotton fields this tool has proven the most desirable of any yet tried.

New ideas on within-the-row cultivation tools have also come to our attention. Most important in this category has been the use of a tool which has already been used with success in other row crops. The Culti-Cover made by the Russell Manufacturing company makes possible a cultivation program now used effectively near Toppenish, Washington, where bull tongues are used to cover up small emerging weeds in the beet row. This cultivator tool bar device consists of two shoes or blades—the front shoe set so as to push crust and weeds away from the beet row and leveling the ground for the rear shoes, which run slightly deeper and which are set to bring fresh moist soil back evenly around the beet plant, smothering those weeds not removed by the front shoe. With one of these tools on either side of the row the combined operation of the front and back shoes maintains an evenly hilled row and kills weeds between the plants in the entire length of row without much injury or disturbance to the sugar beet root system. The tool will work better at speeds above three miles per hour. It is especially adapted to later cultivations; however, experimental work this year will include its use in the earlier stages of growth as well.

Mr. Campbell, a grower in the Imperial valley in Southern California, used a disc to remove the weeds between the two rows planted on a single bed. This disc was run about an inch below the ground surface and was made with bearings which would permit its easy movement should weeds or clods build up on either side. This self-cleaning disc was doing an excellent job. Shields were placed on either side as close to the beet row as tractor driving would permit.

Chemical weed control still has possibilities even though it has not found extensive use in our beet-growing areas, including those areas where

it is most readily adaptable. This past season light 28-inch hoods were built to run over the row. This permitted the use of a higher pressure when the more volatile materials were used as the weed spray. This "fogging in" method proved very successful on a 40-acre tract near Longmont, Colorado, where cooperative work between the Great Western Experiment Station, a local weedicide dealer, Colorado A & M College and the Foundation made use of ordinary fortified diesel fuel to kill a healthy growth of voluntary grain and wild oats just prior to the beet emergence. Hoods make possible the use of a smaller amount of the oil and likewise aid in getting coverage down into the crown, which is so necessary in getting permanent kill on grasses.