

A SPECIAL SWEEP FOR THE APPLICATION
OF SOIL FUMIGANTS AND VOLATILE HERBICIDES

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Chemical weed control has made steady progress in the last twenty years. The spraying of 2,4-D for the control of broad leaf weeds is standard practice on most of the nation's small grain acreage. There are many of the vegetables, small fruits and other row crops that are now receiving selective chemical weed control treatment.

Research in recent years has shown that certain herbicides are more effective if they are placed in the soil profile than when applied to the surface. Results from surface application of volatile materials are frequently erratic. When it rained shortly after application weed control was usually good but if there was no precipitation for several days weed control was poor or no control at all.

In an attempt to get more consistent results with chemicals such as Eptam and Atrazine, a sweep applicator was constructed to apply the herbicides underneath the soil surface. The requirements set forth for the applicator were as follows:

1. The applicator should be capable of applying the chemical as a uniform and continuous 12 inch band at depths of 1 to 3 inches.
2. The chemical should have a soil cover of uniform

thickness.

3. The applicator should attach to the front cultivator frame and not interfere with the operation of a planter mounted on the same tractor.

Jensen and Page⁽¹⁾⁽²⁾ reported on the development of an experimental blade type soil fumigant applicator for applying nematocides in a continuous sheet at injection depths of 6 to 10 inches. Page⁽³⁾ adapted a 6 foot sweep plow for applying soil fumigants as a continuous sheet. Wooten and McWhorter⁽⁴⁾ used a horizontal blade applicator for subsurface application of herbicides.

The straight blade applicator is more subject to fouling by cover crop residues than is the sweep. A 14-inch high lift tillage sweep was selected to allow room for mounting a nozzle and to allow for the chemical spray to fan out to the 10 to 12 inch band. A steel plate was welded between the top edges of the wing blades of the sweep to keep the soil from falling back at low ground speeds. In order to place the nozzle far enough forward it was necessary to alter the attachment of the sweep. The tang or attaching shank of the shovel was removed with a cutting torch and a build-up shank, figure 1, or a 19 inch piece of 5/8" x 2" cultivator shank stock was welded directly to the sweep to form a permanent shank. The application sweep could then be attached to the cultivator bar with regular cultivator attaching clamps. A 1/8" pipe was run

down the back of this shank to a spraying system $1/8$ K flooding nozzle used for dispersion of the chemical. These flooding nozzles have a wide fan angle requiring only 3 inches to fan to a width of 11 inches. This application sweep worked very well when operating at depths of $1\frac{1}{2}$ inches or greater.

In 1960, volatile chemicals were applied at planting time with this injector and also as a surface application. There was no rain following application and the surface application had no noticeable weed control, but the injected chemical controlled both the weeds and the crop plants in some cases. It was found by investigators at Oregon State University and by research workers at other locations in the nation that less chemical is required for weed control when injected into the soil than when sprayed on the surface and rained in.

The sweep functioned so well for the application of herbicides that this same type of equipment was tried for the application of soil fumigants for the control of symphylids. Symphylids are small pearly white centipede-like animals which feed on the roots of a wide variety of host plants. In some areas they limit production of vegetables, mint, small fruits and nursery crops. During the early summer, five additional shovels with $3/4$ " x $2\frac{1}{2}$ " x 25" shanks were built for use with a

regular tractor tool bar. With this type of equipment for application of fumigants for the control of symphylids it is necessary to apply at depths from 6 to 10 inches. A local Conservation District built a large soil fumigation rig, Figure 3, for applying fumigants for the control of symphylids, using nine sweeps of similar construction. The soil fumigation machine built by the Agricultural Engineering Department and the machine built for the Soil Conservation District functioned very successfully in the limited number of acres they were used on last fall. We are still interested in testing the effectiveness of the volatile herbicides injected at a 1 inch depth. To do this will require modifying the present equipment.

Special sweeps for the subsurface application of herbicides have given promising results. Similar sweeps are being used for the application of fumigants for the control of symphylids.

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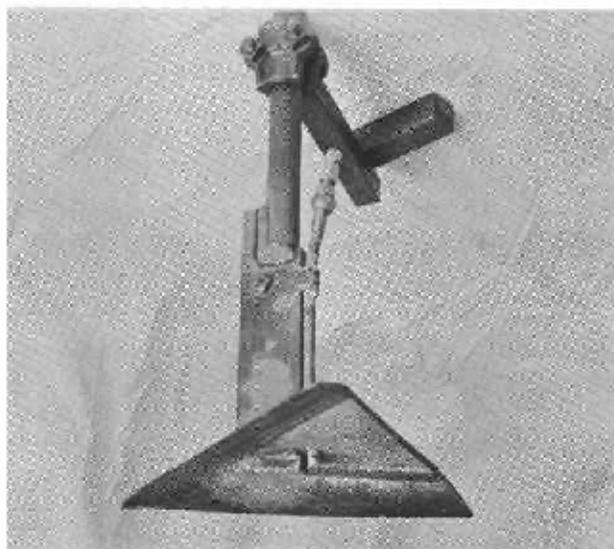


Figure 1. Sweep adapted for sub-surface application of herbicides at depth of 2 to 3 inches.

Figure 2. The application of a volatile herbicide at 2-inch depth while planting soybeans.

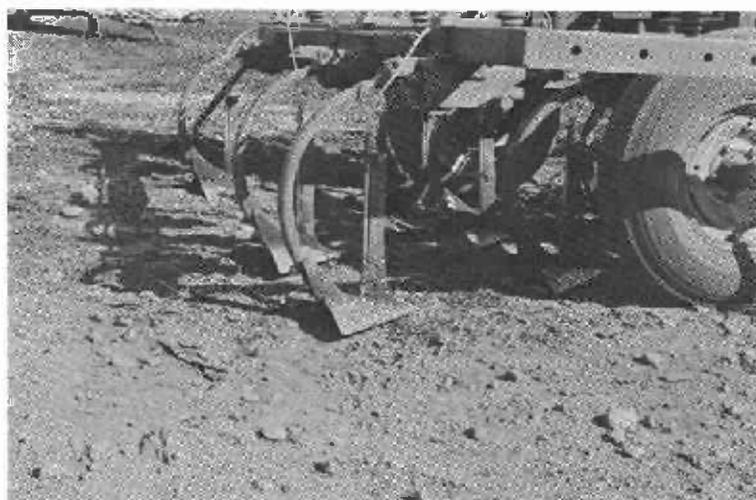


Figure 3. Sweeps for applying soil fumigants at a depth of 10 inches for the control of symphylids.