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 nematicides 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 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 appli-
cation 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 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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4. Wooten, O. B. and McWhorter, C. G., A Device for Subsurface
Figure 1. Sweep adapted for subsurface 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.