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C. G. McWhorter

O. B. Wooten

Ralph S. Baker

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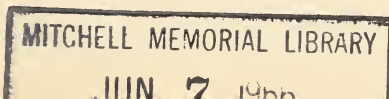
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AGRICULTURAL EXPERIMENT STATION

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On Cover:

Figure 2. Weed control in an 18-inch band centered on the soybean drill following injection of vernolate at 2 lb/A.

PREEMERGENCE HERBICIDE INJECTION FOR WEED CONTROL

By C. G. McWHORTER, O. B. WOOTEN, and R. S. BAKER¹

New herbicides for preemergence weed control in cotton and soybeans are rapidly becoming available to the farmer. Since 1961 the number recommended for use in both soybeans and cotton by the Mississippi Weed Committee increased from 5 to 10. This trend will increase as industrial organizations intensify their search for more selective herbicides.

Federal and State research not only develops new herbicides, but also aims to prove the efficiency of existing materials. For several years, research has been conducted with EPTC (ethyl N,N-dipropylthiolcarbamate) and vernolate (S-propyl dipropylthiocarbamate). This report discusses the new injection technique for applying EPTC and vernolate, and presents data for the calibration of injection equipment.

EPTC and vernolate, although excellent herbicides, present two closely related problems. The best method of application for good weed control, one problem, closely affects the other problem of avoiding crop injury. Both problems are largely eliminated by application with the Stoneville injector.

EPTC and vernolate are highly volatile, and if not incorporated or injected into the soil will quickly evaporate from a hot soil surface. Even after thorough mixing with a ground-driven soil incorporator, a small amount of herbicide will be lost by evaporation, thereby decreasing weed control.

By injecting thin streams of these herbicides into the soil about 3 inches apart, the volatility is utilized to control weeds between the points of injection. Herbicide losses due to volatilization apparent-

ly are reduced by use of the Stoneville injectors.

A single Stoneville injector consists of a thin metal blade sharpened on the leading edge. A small tube attached to the trailing edge of the blade conveys the herbicide to the bottom of the slit created by the blade. An operating depth of 1 to 1 1/2 inches results in good weed control. When the injectors are properly operating, no liquid is visible on the soil surface after they have passed through the soil. Figure 1 illustrates a single injector at operating depth in the soil, and injector spacing for use in cotton and soybeans.

Injector equipment can be adjusted to apply herbicides in both cotton and soybeans. The only differences in the equipment used in the two crops are in the spacing of the inside or center injectors, and the number of injectors per row. For vernolate in soybeans six injections per row spaced 3 inches apart are centered over the drill. For EPTC application in cotton four injectors per row are used. EPTC is more toxic to cotton than vernolate is to soybeans; therefore, the center injectors are set 8 inches apart. It is important that the injectors be precisely mounted in relation to the planter. The inside injectors should be no closer than

¹Plant Physiologist, Crops Research Division, Agricultural Engineer, Agricultural Engineering Research Division, U. S. Department of Agriculture, Plant Physiologist, Delta Branch Experiment Station, Stoneville, Mississippi, respectively.

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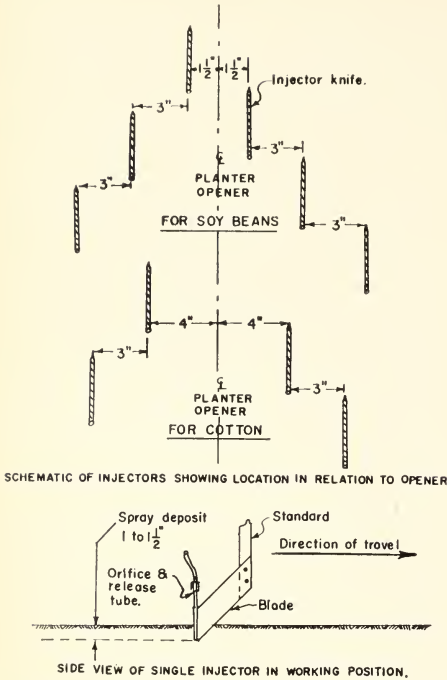


Figure 1. Injector setting for preemergence weed control in cotton and soybeans.

1 1/2 inches from the soybean drill or 4 inches from the cotton drill.

The injectors may not operate satisfactorily in fields where large weeds have been disked just before planting. Large amounts of loose trash may "ball up" ahead of the injectors and disturb the seedbed.

Vernolate Applied Preemergence in Soybeans

Vernolate, applied preemergence in soybeans at 2 to 3 pounds per acre, is effective on all soils. The highest rate is necessary only on heavy clay.

Vernolate will provide good to excellent control of grasses and broad-leaved weeds such as crabgrass, goosegrass, cocklebur, morning glory, nutsedge, and pigweed. It will also control Johnsongrass from seed or from rhizomes or root stocks. Fig. 2 (on cover) shows typical control of weeds in soybeans ob-

tained with vernolate in 1965.

Injected vernolate has caused minor soybean injury. Under adverse conditions such as extremely heavy rainfall, slight injury has shown up immediately after emergence, but this was temporary and has not reduced soybean yields.

EPTC Applied Preemergence in Cotton

EPTC applied preemergence in cotton 1 1/2 lb/A is effective and safe for weed control in cotton. The heavier rate is necessary only on clay loam and clay. It controls a wide spectrum of small-seeded annual grasses and broad-leaved weeds in addition to nutsedge.

Use of EPTC as discussed in this report is a portion of the triband weed control program described in the 1966 Weed Control Recommendations issued by the Mississippi Weed Committee. With the inside injectors spaced 8 inches apart and centered on the drill, a 3- to 5-inch strip of weeds will escape the action of EPTC (Figure 3). Annual weeds in the immediate cotton drill can be controlled by application of a preemergence material such as diuron 3-(3,4-dichlorophenyl)-1,1-dimethylurea or trifluralin (α , α , α -trifluoro-2,6-dinitro-N, N-dipropyl-p-toluidine).

One distinct advantage of EPTC over other preemergence materials is its consistent control of nutsedge as shown in Figure 3. While this weed is controlled only on the row shoulders, nutsedge that emerges in the immediate drill can be controlled with postemergence applications of herbicidal naphtha or DSMA (disodium methanearsonate) as recommended by the Mississippi Weed Committee. Two to three applications of these herbicides usually provide control until the cotton is large enough to shade the entire drill.

Injector Calibration

Injector equipment differs from more conventional herbicide spray equipment in that flat-disc orifices (rather than



Figure 3. Nutsedge control in cotton with EPTC injected in two 6-inch bands starting 4 inches from the drill on both sides of the center row. To complete control use postemergence naphtha or DSMA.

conventional nozzle tips) are used to meter the spray solution. Also, four to six orifices per row are required rather than the conventional one tip.

As with other calibration procedures, the speed at which the planter-tractor travels in the normal planting operation is first determined (Table 1, Section C). Next, the correct orifice size and approximate pressure for the desired planting speed are selected from the orifice size-guide in Table 1, Section B. The orifices are then placed in the nozzle bodies which are screwed to the delivery pipes on the rear of each injector. A regular 100-mesh nozzle screen is placed on top of the orifice in each nozzle body, the nozzle caps are tightened, and the equipment is ready for calibration.

Flat pans under the injectors can catch a full row at one time (Figure 4). The time in seconds to catch a quart of water at the desired operating speed is presented in the columns labeled 4 or 6 injectors in Table 1, Section C. The correct pres-

sure is determined by varying the approximate pressure up or down until a quart is delivered in the specified time.

Example: If the equipment travels over a 300-foot course in 51 seconds for a speed of 4.0 MPH. The operator wishes to apply vernolate in soybeans, using 6 injectors per row. To determine the delivery time for 6 injectors, look down the right-hand column across from 4.0 MPH and find 62 seconds per quart. This indicates that 6 injectors should deliver 1 quart in 62 seconds to give a 20 gpa spray volume.

Band widths and spray volume rates for both four- and six-injector arrangements are given in Table 1, Section A. In both cases, the broadcast spray volume is 20 gal/A. Therefore, the herbicide tank mix is prepared to contain the appropriate amount of herbicide for 1 acre in 20 gallons of water.

Injection equipment and disc orifices for metering herbicide spray solutions described in this report will be available

throughout the Delta of Mississippi in 1966. EPTC and vernolate will also be available throughout the Delta. The approximate cost of using EPTC on cotton will be from \$0.85 to \$1.25 per acre, depending on the rate. It will cost approximately \$2.50 to \$4.50 per acre for a pre-emergence treatment of vernolate, depending on the width of the band and soil

type. These are actual chemical costs, however, and they are in addition to application costs. Both materials control certain weed species that are extremely difficult to control with other herbicides. Because of this advantage it seems likely that these herbicides will be used in rapidly increasing quantities by Delta farmers.

Table 1. Calibration data for Stoneville injectors spaced at 3-inch intervals.

A. Desired rate of spray mixture expressed several ways and area covered by treatment.

Rate expression or area covered	No. of injectors per row	
	4	6
Gal/A, broadcast basis	20 gal	20 gal
Gallons delivered by all injectors on one row while traveling 13068 feet ¹	6 gal	9 gal
Total band width effectively covered by injectors	12 inch ²	18 inch

B. Guide for orifice size selection (Pressures are approximate and serve only as a starting point).

Orifice size and pressure	Speed (MPH)						
	3	4	5	6	6	7	7
Orifice diameter (inches)	.020	.020	.024	.024	.029	.024	.029
Approximate pressure (PSI)	18	25	22	28	15	38	19

C. Number of seconds required for delivery of one quart from 4 or 6 injectors per row to obtain 20 gal/A broadcast spray volume at specified speeds.³

MPH	second/300 ft.	Time for delivery of 1 quart from:	
		4 injectors seconds/qt.	6 injectors seconds/qt
2.2	93	169	112
2.4	85	155	104
2.6	79	143	96
2.8	73	133	88
3.0	68	124	82
3.2	64	116	78
3.4	60	109	72
3.6	57	103	68
3.8	54	98	66
4.0	51	93	62
4.2	49	88	58
4.4	46	84	56
4.6	44	81	54
4.8	43	77	52
5.0	41	74	50
5.2	39	71	48
5.4	38	69	46
5.6	37	66	44
5.8	35	64	42
6.0	34	62	42
7.0	29	53	36

¹13068 row feet equals one acre where rows are 40 inches wide.

²Consists of 2 bands, each of 6-inch width.

³Start with approximate pressure given in "B" above, and adjust until one quart is delivered in correct number of seconds.

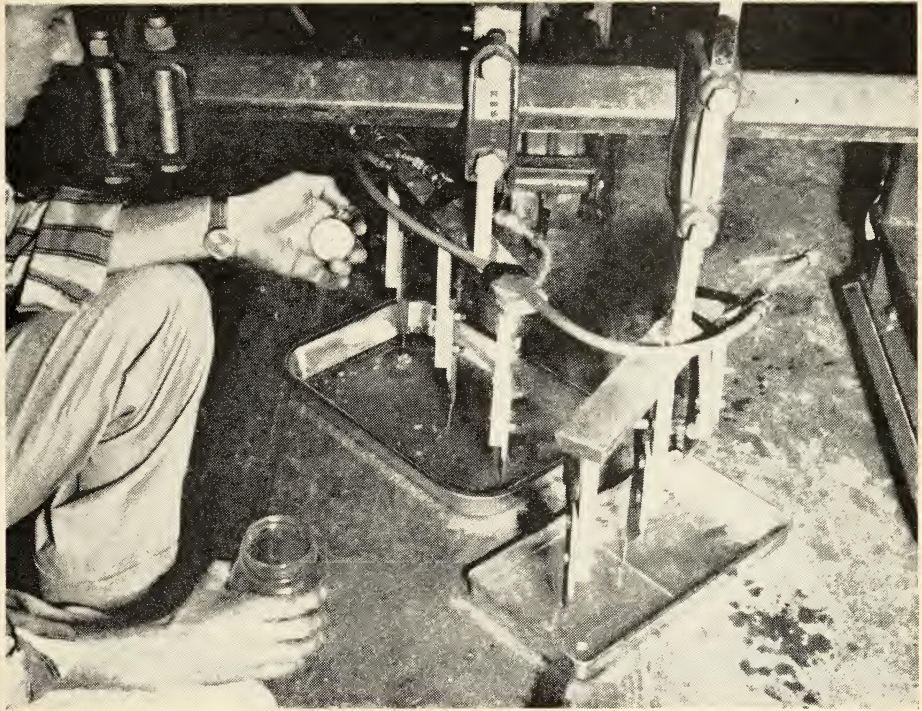


Figure 4. Method of calibrating injectors. Water from both pans should be poured into one quart jar for accurate measuring.

PRECAUTIONS

Pesticides, improperly used, may be injurious to man, desirable plants, and animal life. **Follow the directions and heed all precautions on the labels.** Stored pesticides should be kept in closed, well-labelled containers in a dry place.

Store them where they will not contaminate food or feed, and where children and animals cannot reach them. Do not clean application equipment or dump excess pesticide where it will contaminate lakes, streams, ponds, or other water sources.