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EQUIPMENT FOR FIELD SPRAYING FOR WEED CONTROL

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Purpose. This circular is written to provide brief suggestions regarding the equipment necessary for spraying for weed control. For information on other phases of weed spraying see Station Bulletin No. 403, "Selective Sprays for Weed Control in Crops."

Spray Equipment. Under present conditions very few new spray outfits are available, and the problem in most instances will be one of adapting existing orchard or hop sprayers to field spraying. In localities where hop growers have changed from spraying to dusting, used hop sprayers may be available.

When buying used equipment, the purchaser should make sure that it is in good condition and that it has ample capacity to meet his requirements. If the owner or local dealer cannot give the capacity of the machine, operate it under 150 pounds pressure and measure the discharge for a number of minutes. The pump capacity in gallons per minute can then be calculated. For example, if a spray pump fills a 50-gallon barrel in 5 minutes, the capacity of the pump is 10 gallons per minute, which is usually written as 10 g.p.m.

Nozzles. A nozzle which will produce a flat, fan-shaped spray is necessary. Each nozzle should have an output of 3/4 to 1 gallon per minute under the pressure at which it is to be operated. Since orchard and hop sprayers operate at much higher pressures than are required for field spraying, some adjustment of the pressure regulator will be necessary. Pressures of 100 to 150 pounds are ample for weed spraying. Nozzles should be ordered with 1/4" pipe thread female connections.

The Sprayer Boom. The best arrangement is to mount the sprayer boom in front of the tractor which pulls the spray rig. In case the spray outfit is placed on a pickup or truck, the boom can be supported above the bumper. In either case arrangements should be made in the supporting brackets so the boom can be adjusted to discharge the spray about 18 inches above the crop.

The boom should be made of standard pipe 1½ inches in diameter. It may be made in three sections, with the center section approximately eight feet long attached to the supporting brackets. A tee should be included in this center section in order to connect with a one-inch pipe line from the sprayer pump. Pipe unions should be screwed on each end of the center boom section so that extensions can be attached to make the boom as long as required. The end sections can then be quickly detached at the unions to permit passing through gates or along public roads.

Pipe caps or plugs should be placed on each end of the boom so it may be flushed out after using.

Drill and tap the pipe boom at 18 inch intervals, attaching 1/4" pipe nipples to receive the nozzles. The pipe nipples should be screwed up into the boom about $\frac{1}{2}$ inch. This allows sediment to collect in the bottom of the boom instead of entering the nipples and plugging the nozzles. One and one-half inch pipe is recommended for the boom in order to allow plenty of room for the $\frac{1}{4}$" nipples to project upward inside the pipe and still provide adequate space for the flow of the spray liquid. If desired, the nipples may be attached to the boom by drilling holes slightly larger than the nipples and welding them in place.

When the nozzles are attached to the nipples, the nozzle disks must be adjusted so the flat spray is approximately parallel to the boom and at right angles to the direction of travel. The nozzle disks must be set so that the sprays do not interfere with one another. This may be accomplished by turning the disks so the flat spray is discharged at a very slight angle to the center line of the boom. The sprays should overlap but should not strike or interfere with one another.

Length of Boom. The length of the boom will be limited principally by the capacity of the pump. For example, a spray pump with a capacity of 12 gallons per minute will supply 12 nozzles with a capacity of one gallon per minute each, or 16 nozzles with a capacity of 3/4 gallon per minute each. Twelve nozzles spaced 18 inches apart will require a boom 18 feet long, while 16 nozzles will require a 24 foot boom.

Connecting the Boom to the Spray Pump. Iron pipe may be used for much of the distance between the boom and spray pump, but a length of hose long enough to afford a flexible connection between the boom and the spray rig must be used on tractor-drawn outfits. The hose and pipe used should be large enough to prevent excessive pressure losses due to friction. It is not advisable to use pipe less than one inch inside diameter. The use of an excessive number of elbows should be avoided, as each 90° elbow is equivalent to about 6 feet of pipe in causing friction losses.

Where a flexible connection is required, use 3/4 inch or larger high pressure spray hose. A "hose to pipe" nipple will be required at each end, as pipe threads differ from the threads on hose fittings. When connecting the hose to the pipe do not use a pipe so small that the 3/4 inch hose can be slipped over it, as even a short length of such a small pipe will seriously restrict the flow of the spray liquid.

Operation. To apply the spray at the usual rate of 100 gallons per acre, an outfit using one-gallon-per-minute nozzles spaced 18 inches apart on the boom should travel at 3.3 miles per hour. With nozzles discharging 3/4 of a gallon per minute for each $1\frac{1}{2}$ ft. of boom, the outfit must move forward at the rate of 2.5 miles per hour in order to apply 100 gallons per acre.

Determining Speed. Before commencing to apply the spray, the operator should select some method of measuring the rate of travel of the outfit. One method is to measure off a certain distance, such as 290 or 220 feet, depending on the rate of travel desired. A rate of 3.3 miles per hour is equivalent to 290 feet per minute, while 2.5 m.p.h. equals 220 feet per minute.

After measuring off the required distance and marking it with stakes, mark a point on the wheel of the tractor which can be easily observed by the tractor operator. Then drive the outfit over the measured distance, counting the revolutions of the wheel. Thereafter, to attain the desired speed, the tractor throttle should be so adjusted that the tractor wheel will make the necessary number of revolutions in one minute. By counting the number of revolutions the wheel makes in one minute, or part of a minute, the operator can easily check his speed at any time and as often as desired.