weeds - Equipment

herbicide sprayer

CALIBRATION

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HERBICIDE SPRAYER CALIBRATION

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Importance of Accurate Calibration

The success of a chemical weed control program is greatly influenced by the accurate calibration of the sprayer.

The application of less than an adequate amount of herbicide can result in poor weed control. Conversely, exceeding the recommended rate of herbicide application through improper calibration of the sprayer can result in crop injury.

In the application of herbicides, with very few exceptions, the volume of spray solution is not as critical as the accuracy of the application of the desired amount of chemical per acre.

Herbicides can be applied with a ground sprayer delivering as low as 20 gallons to as high as 100 to 120 gallons of spray solution per acre.

Changes in Rate of Application

The rate of application will be governed by:

1. Nozzle size (orifice)
2. Speed of travel
3. Nozzle spacing on the boom
4. Operating pressure

Changes in the rate of application can be obtained by varying the above.

Major changes in volume can best be made by changing the nozzle tips or size (orifice) or in broadcast application by varying the number of nozzles on the boom.

Minor changes can be made by changing the operating pressure. Changing the speed of travel can also be used to vary the rate of application, but for the sake of economy it should remain the maximum at which proper application is possible.

Calibration involves the determination of how much water the sprayer is applying over an acre. Once this is determined, the proper amount of herbicide can be added to the known volume being applied over an acre.

There are many ways to accurately calibrate a sprayer. The following is but one simple method of direct calibration:

1. Measure and mark off a test distance (200' to 400' is convenient).

2. Determine the speed of travel to be used when spraying (3-4 mph desirable).

3. Start sprayer and the tractor 30-50 feet from measured area.

4. Catch discharge from <u>one nozzle</u> as the sprayer travels through the measured distance.

5. Multiply the amount of water caught in the measured distance by the number of nozzles on the boom.

6. Measure the width of the area sprayed by all nozzles.

With the preceding information, the gallons per acre applied is determined as follows:

$$\text{Gal/ac} = \frac{\text{sq.ft/ac x gal sprayed in test area}}{\text{test distance(ft) x width of sprayed area (ft)}}$$

Example 1:

Test distance equals 300'.

The boom contains 10 nozzles.

The width of sprayed area 15'.

The spray volume per nozzle in the test area 2 qts.

Then: Total spray delivered in test area 2 qts. x 10 = 5 gallons, and the formula

$$\text{Gal/ac} = \frac{43560 \times 5}{300' \times 15} = \frac{217800}{4500} = 48.4 \text{ gal.}$$

To change this rate of delivery, change any one or more of the following: nozzle size, speed of travel, operating pressure.

The recommended rate per acre of herbicide can be added -- in this example, to each 48.4 or 48½ gallons of water.

When using an herbicide formulated as a liquid, reduce the volume of water by the volume of liquid herbicide added.

Tractor with Speedometers

If a tractor with an accurate speedometer is used to pull the sprayer, the calibration can be done without pulling the sprayer over a test (measured) distance. Instead, catch the discharge from one nozzle for one minute and use:

176 feet if travel is 2 mph

264 " " " " 3 "

352 " " " " 4 "

440 " " " " 5 "

Calculations are the same as in example one. Instead of test distance, substitute approximate feet of travel in 1 minute at the mph the sprayer will travel.

Calibration for Band Treatment

The calibration and calculations for band treatment are the same as for solid or broadcast treatment. In the formula, the spray volume should be in fractions of a gallon and sprayed area in feet or fractions of a foot.

Example 2:

Test distance 300'.

Spray volume per nozzle 2 qts. (.5 gals.).

Width of sprayed area (band) 12 inches.

$$\text{Gal/ac} = \frac{43560 \times .5 \text{ (gal)}}{300' \times 1' \text{ (band width)}} = 72.6$$

This is the application rate per acre whether one or several nozzles are used.

Pounds Per Acre of Herbicide Needed in Band Treatment

To determine the amount of herbicide needed per crop acre if the herbicide is applied in a band, divide the width of band to be treated by row spacing and multiply by rate per sprayed acre. Always use the same units (inch or foot) in calculating the band or row spacing.

Example 3:

Row crops.

Treated band 10".

Row spacing 42".

Herbicide per acre 6 lbs.

To be treated 40 acres.

Amount of herbicide needed per crop acre =

$$\frac{10''}{42''} \times 6 = 1.43 \text{ lbs.}$$

For 40 acres: 1.43 x 40 = 57.2 lbs. is needed.

Example 4:

Vineyard.

Treated band 4'.

Row spacing 12'.

Herbicide per acre 4 lbs.

To be treated 50 acres.

Amount of herbicide needed per acre of vineyard =

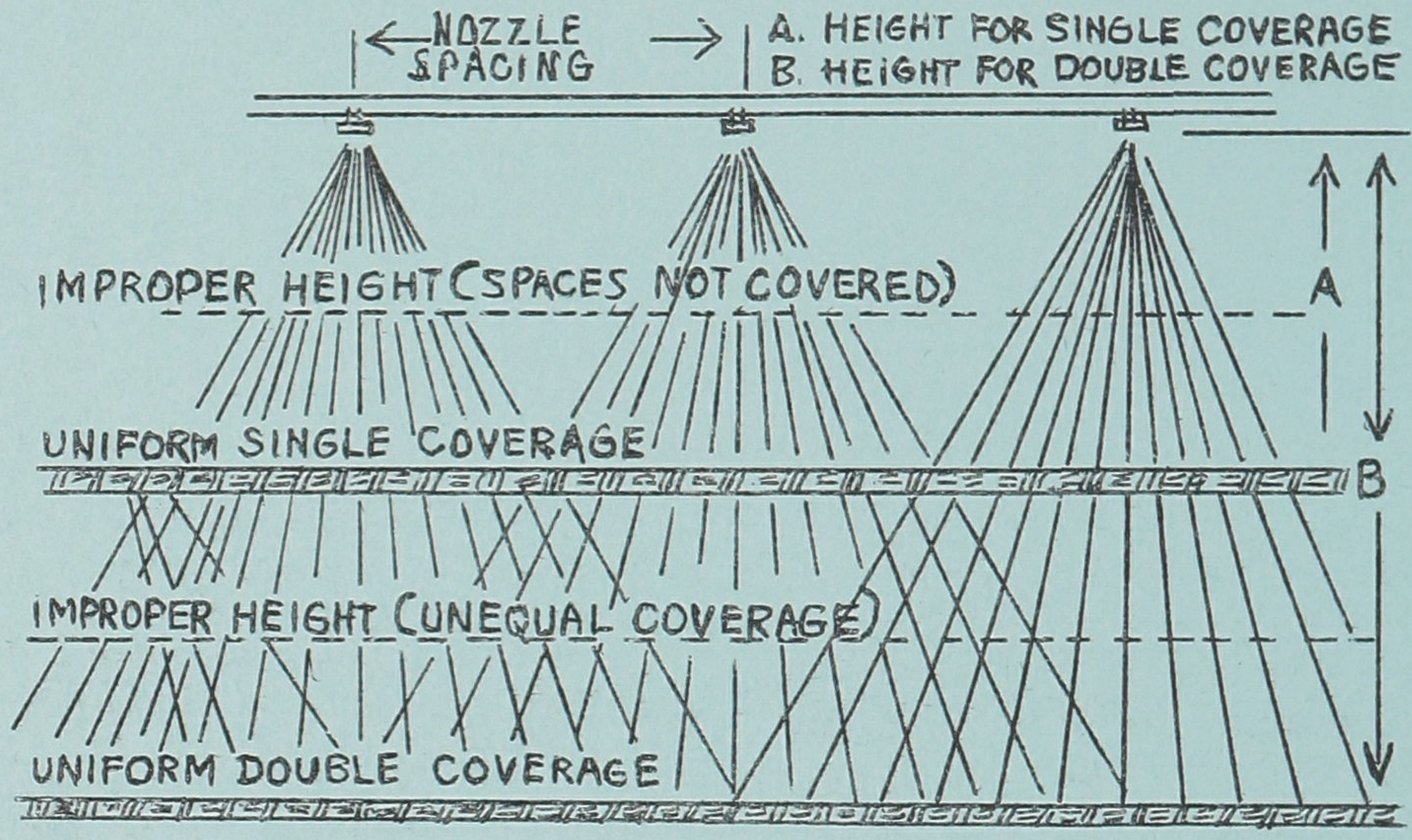
$$\frac{4'}{12'} \times 4 = 1\ 1/3 \text{ lbs.}$$

For 50 acres: 1.3 x 50 = 65 lbs. is needed.

Calibrate a sprayer frequently. Many of the herbicides used have low water solubilities and are applied as wettable powders resulting in rapid wear of nozzle tips.

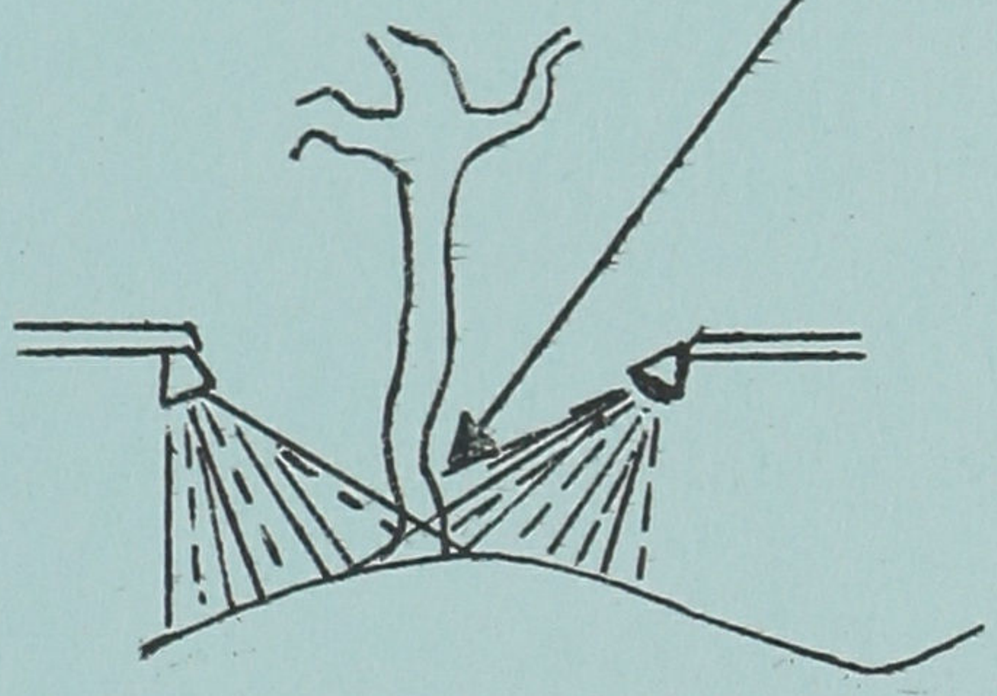
Boom Adjustment

The final adjustment of the boom or nozzles, in directed spray, should be made in the field where spraying is to be done. Improper height of the boom can result in uneven or poor coverage as illustrated below.

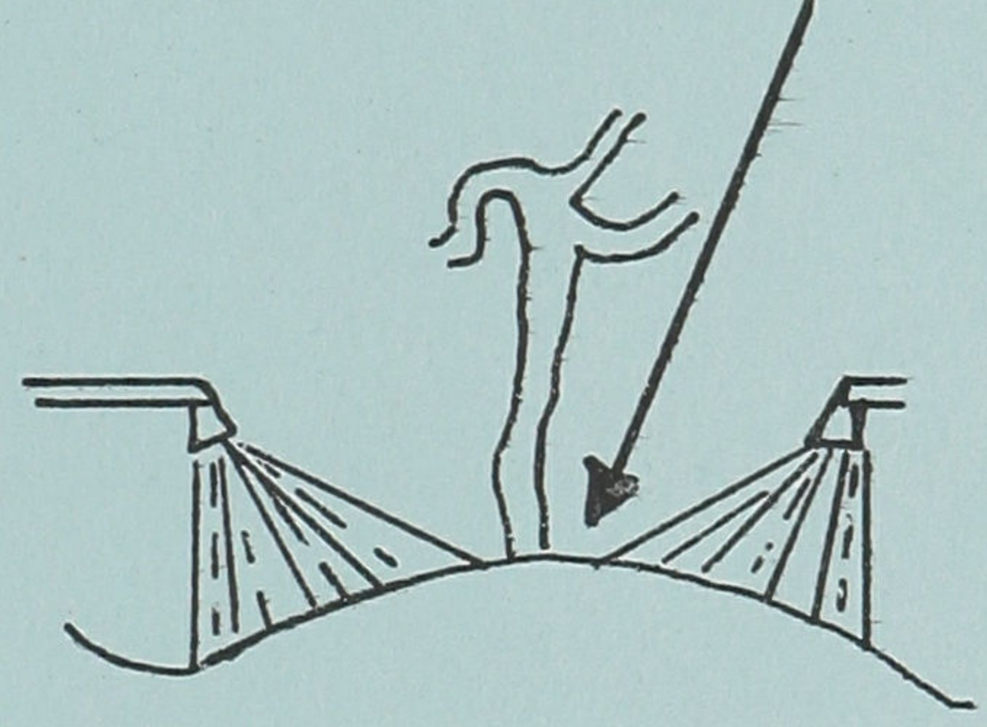


The nozzle fan width and the spacing on the boom determine how high the boom must be above weed growth to have the fans meet. Double coverage gives more uniform application because ground is covered by spray from two nozzles and tends to counteract any nonuniformity in nozzle characteristics.

In vineyards, a narrow untreated band under the vine row is a common problem unless the height of the boom is properly adjusted as the following sketches show.



Adjusted in field - good coverage.



Boom height adjusted on road - sprayer travels in furrow - resulting in poor coverage.

REFERENCES USED:

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"FARM POWER SPRAYER".
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