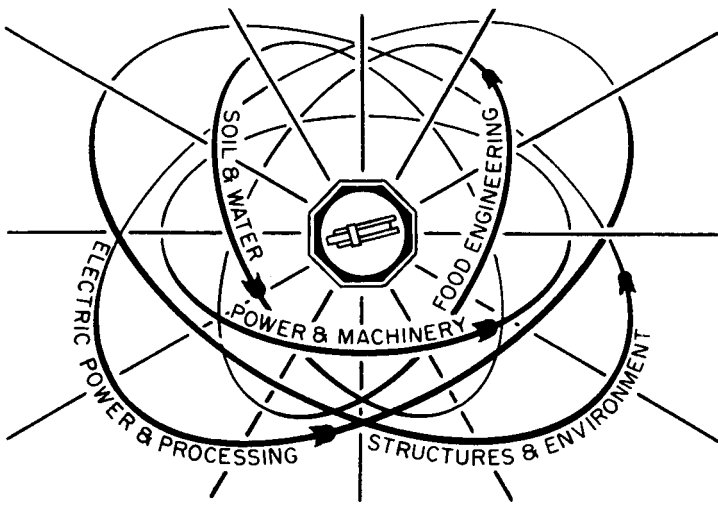


Agricultural Engineering

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CALIBRATION OF SPRAYERS

Sprayers should be calibrated at the start of each spraying operation and frequently thereafter. The rate of application will be determined by the rate of discharge of the nozzles and the rate of forward speed. If the required size nozzles are used and are functioning properly at the required pressure, then the principal purpose of calibration is to determine the proper rate of forward speed. A tractor speedometer proves very useful in maintaining a uniform rate of travel.

Method 1

Essential steps in calibrating a sprayer are as follows:

1. Set two stakes 40 rods apart (660 feet).
2. Fill the sprayer tank with water. Operate the sprayer to be sure the entire supply line up to the shut-off valve is full before finally filling the tank and recording the water line on a measuring stick.
3. Drive the sprayer round trip between stakes (80 rods total) at the desired speed and with the sprayer in full operation. The sprayer should be moving at normal speed with pressure up and the discharge valve should be opened as the sprayer passes the first stake and closed as it passes the second stake in each direction. Mark the throttle setting.
4. Carefully measure the amount of water required to fill the tank after the test. Before refilling to the same mark on the measuring stick, be sure that the sprayer is in the same position as for the first filling or is resting level in both instances to avoid possible error.
5. Multiply gallons used to refill tank by 33 and divide by the width sprayed in feet. This gives gallons per acre applied.

Example: Assume it is desired to apply a spray material at the rate of 10 gallons per acre traveling at a forward speed of 5 mph with a boom covering a 20-foot width. If 5 gallons of water were required to refill the tank after the calibration, then the actual rate of application is determined as follows:

$$\text{gpa} = \frac{5 \times 33}{20} = 8.2 \text{ gallons per acre}$$

Since this rate of application is lower than desired, the forward speed must have been greater than 5 mph. Therefore, the test should be repeated using a throttle setting which will give a slightly slower rate of travel.

Method 2

Another way to calibrate the sprayer that might be easier and just as good is as follows:

1. Measure the width in feet which the boom covers. Allow for proper overlap.
2. Divide 43,560 (number of square feet in one acre) by the width covered. This will give the number of feet to travel to cover 1 acre. Example: Boom covers 20 feet; 43,560 divided by 20 equals 2178 feet. This is the distance to travel to cover 1 acre.
3. Measure off the feet needed to travel to cover 1 acre.
4. Fill the spray tank with water; be sure it is full up to the same point where it is normally filled.
5. Set the sprayer pressure exactly the same as used when actually spraying and travel down the course measured in Step 3.
6. Measure carefully the number of gallons of water needed to refill the tank.
7. The number of gallons required to fill the tank is the number of gallons the sprayer applies per acre.
8. Assume 10 gallons are needed to fill the tank. For each 10 gallons of water in the tank, add the amount of chemical recommended per acre.

Method 3

Use a calibrated measuring device. A 1-quart container made of clear plastic is strapped under one nozzle so the nozzle sprays into the container through an opening in the lid. The sprayer is then operated a measured distance, and the actual rate of spray is read at the level of the liquid on the container's calibrated sides.

TABLE 1 MINUTES TO SPRAY ONE ACRE AT VARIOUS SPEEDS AND BOOM WIDTHS*

Speed		Width Covered by Boom (Feet)						
MPH	Ft. per min.	10	15	20	25	30	40	50
2	176	24.8	16.5	12.4	10.0	8.3	6.2	5.0
3	264	16.5	11.0	8.3	7.0	5.5	4.1	3.3
4	352	12.4	8.2	6.2	5.0	4.1	3.1	2.5
5	440	9.9	7.0	5.0	4.0	3.3	2.5	2.0
6	528	8.3	5.5	4.2	3.3	2.8	2.1	1.5
7	616	7.1	4.7	3.5	2.8	2.4	1.8	1.4
8	704	6.2	4.1	3.1	2.5	2.1	1.6	1.2
9	792	5.5	3.7	2.8	2.2	1.8	1.4	1.1
10	880	5.0	3.3	2.5	2.0	1.7	1.2	1.0

*No allowance made for turning, filling, or servicing sprayer.

TABLE 2 TIME REQUIRED TO TRAVEL VARIOUS DISTANCES AT VARIOUS SPEEDS

Speed		100 Ft.	500 Ft.	660 Ft. (40 rds.)	1320 Ft. (80 rds.)	2640 Ft. (160 rds.)
MPH	Ft. per min.				(1/4 mi.)	(1/2 mi.)
		min-sec.	min-sec.	min-sec.	min-sec.	min-sec.
1	88	1-8	5-39	7-30	15-0	30-0
2	176	0-34	2-50	3-45	7-30	15-0
3	264	0-23	1-55	2-30	5-0	10-0
4	352	0-17	1-25	1-53	3-45	7-30
5	440	0-14	1-8	1-30	3-0	6-0
10	880	0-7	0-34	0-45	1-30	3-0

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