Accuracy equals economy. This article from "The Golf Course Reporter" will help you to get the most out of expensive materials.

HERBICIDE EQUIPMENT CALIBRATION

By Dr. J. R. Orsenigo

WILL "Weedkiller Super Z" control the weeds in your turf? It will if you have taken two correct steps. *First:* Selection of the proper chemical for the particular turf-grass and weed problem. *Second:* Accurate application of the right amount of chemical at the right time in the right way in the right place.

The effectiveness of any chemical can be reduced markedly by misapplication. The wrong weed killer, or faulty application, can cause turf injury or poor weed control.

Accurate calibration is the key to applying the right amount of chemical weed killer. The procedures listed below are not unique but will facilitate proper calibration of both dry and liquid chemical applicators. It is desirable to calibrate on the terrain to be treated since errors are common when equipment is calibrated on paved roadways.

Equipment should not be ignored after calibration. Repeated periodic "calibration checks" will ensure accurate application.

The remainder of this article discusses basic but practical essential suggestions for calibration of A. Dry materials and B. Liquid Materials.

A. CALIBRATION FOR DRY MATERIALS

Table 1.—Preferred General Procedure

1. Adjust delivery openings on applicator at estimated or approximate setting and fill hopper with a weighed amount of chemical to be applied.

2. Set tractor or unit speed as it will be operated in field.

3. Operate unit over a measured course of several hundred yards in field: the dry chemical can be collected by suspending a trough or pan beneath the delivery openings.

4. Weigh the amount of chemical remaining in the hopper and calculate the amount of dry chemical applied as follows: Original chemical loaded in hopper minus chemical remaining in hopper equals amount of chemical applied.

5. Calculate area treated: Width of applicator swath times distance covered equals area of measured course in square feet.

6. From 4 and 5 calculate amount of dry chemical applied per acre as follows:

$$\text{Lbs. per acre} = \frac{43{,}560 \times \text{lbs. applied over course}}{\text{area of measured course in sq. ft.}}$$

This value will be lbs. per acre of formulated chemical applied. To determine amount of active ingredient applied, multiply lbs per acre by percent active concentration and divide by 100, as follows: Lbs. per acre active =

$$\frac{\text{lbs per acre formulated chemical} \times \% \text{ act.}}{100}$$

7. Rate of application is increased by wider delivery openings.

8. Rate of application is decreased by narrower delivery openings.

9. Complete calibration by adjusting unit and testing until desired quantity of material is applied.

Example: A dry chemical applicator is 10 feet wide. When driven over a distance of 435 feet it distributed 20 lbs. of chemical at a given delivery opening.

$$\text{Lbs. per acre} = \frac{43{,}560 \times 20 \text{ lb.}}{10\text{ft.} \times 435 \text{ ft.}} = 200 \text{ lb./A}$$

formulated chemical.

If the active ingredient concentration was 20 per cent, the rate of active material applied per acre was:

$$\text{Lbs. per acre active ingredient} = \frac{200 \text{ lb.} \times 20\%}{100} = 40 \text{ lb./A}$$

active.

Table 2.—Alternative Procedure

1. Adjust delivery openings on applicator to estimated or approximate setting and fill hopper with a weighed amount of chemical to be applied.

2. Jack up applicator so that wheels do not touch the ground. Tie a piece of cloth (or paint) to one spoke of wheel.

3. Place a piece of canvas or sheet metal under the delivery openings to catch the chemical when it is dispensed.

4. Open shut-off control to permit the chemical to flow and make 43 complete revolutions of the drive wheels.

5. Shut off flow from hopper and weigh the chemical delivered during the 43 drive wheel revolutions.

6. Calculate the amount of chemical discharged on a per acre basis with the following formula :

$$\text{Lbs. per acre dry chemical} = \frac{\text{Lbs. discharged} \times 1000}{\text{Spreader width (ft.)} \times \text{wheel circumference (ft.)}}$$

This value will be lbs. per acre of formulated chemical applied. To determine amount of active ingredient applied multiply lbs. per acre above by per cent active concentration and divide by 100, as follows :

$$\text{Lbs. per acre active} = \frac{\text{Lbs. per acre formulated chemical} \times \% \text{ act.}}{100}$$

7. Rate of application is increased by wider delivery openings.

8. Rate of application is decreased by narrower delivery openings.

9. Complete calibration by adjusting unit and testing until desired quantity of material is applied.

10. Check calibration by observing amount of chemical applied to a field of known acreage.

Example: A dry chemical applicator is jacked up and the drive wheel is turned through 43 complete revolutions. The wheel circumference is 9 ft. and the spreader width is 8 ft. The chemical delivered in 43 wheel revolutions is 20 lbs.

$$\text{Lbs. per acre dry chemical} = \frac{20 \times 1000}{8 \text{ ft.} \times 9 \text{ ft.}} =$$

277 lb./A.

If the chemical contains 20 per cent active ingredients :

$$\text{Lbs. active ingredients per acre} = \frac{277 \times 20\%}{100}$$

= 55.4 lb./A.

B. CALIBRATION FOR LIQUID MATERIALS

Table 3.—Sprayer Calibration: General Procedure

1. Adjust nozzles, pressure and tractor speed as they will be operated in field.

2. Fill herbicide tank with water.

3. Operate unit as in number 1 above and spray water over a measured course of several hundred yards in field.

4. Determine amount of water required to refill tank to replace that sprayed over measured course.

5. Calculate area sprayed : Width of boom coverage times distance sprayed equals area of measured course in square feet.

6. From 4 and 5 calculate amount of water applied per acre as follows :

$$\text{GPA} = \frac{43{,}560 \times \text{gal. sprayed over course}}{\text{area of measured course in sq. ft.}}$$

7. Gallons of spray applied per acre can be decreased by : smaller nozzle tips, less spraying pressure, or faster unit speed.

8. Gallons of spray applied per acre can be increased by : Larger nozzle tips, higher spraying pressure, or slower unit speed.

9. Complete calibration by adjusting and testing unit until it applies desired gallons per acre : Then, add desired quantity of herbicide per acre to amount of water sprayed per acre by the unit.

Example: A sprayer covers a swath 10 ft. wide. When driven over a distance of 435 ft. it sprayed 2 gal. of solution at the operating speed, pressure and nozzle size.

$$\text{Gal. per acre} = \frac{43{,}560 \times 2 \text{ gal.}}{10 \text{ ft.} \times 435 \text{ ft.}} = 20 \text{ gpa.}$$

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Table 4.—Herbicide Sprayer Calibration Table: Brush Boom for Broadcast Spraying

To use this Table: Have sprayer equipped with proper nozzle tips and with tips, tractor speed and spraying pressure adjusted as for field operation. Then, operate unit in field and collect spray liquid discharged by several nozzle tips over a measured distance of 300 ft.

Average quantity of liquid sprayed *per tip* in Ounces. Locate this figure in left-hand column of table and read directly the gallons per acre rate under the nozzle spacing column for your boom.

	Amount of Spray Delivered by one Nozzle in 300 ft.	*Gals. per acre applied at Nozzle spacings of:* 15 *inches*	18 *inches*	21 *inches*
	ounces			
	8	7.3	6.1	5.2
	10	9.1	7.6	6.5
	12	10.9	9.1	7.8
	14	12.7	10.6	9.1
PT	16	14.5	12.1	10.4
	18	16.3	13.6	11.7
	20	18.2	15.1	13.0
	22	20.0	16.6	14.3
	24	21.8	18.2	15.6
	26	23.6	19.7	16.9
	28	25.4	21.2	18.2
	30	27.2	22.7	19.5
QT	32	29.0	24.2	20.8

EXAMPLE: When run down the field at operating speed and pressure a sprayer has an average nozzle tip delivery of 26 ozs. of solution in 300 ft. Nozzles tips are spaced 18 inches apart on the boom. The gals. per acre rate is found in the 18 in. column opposite 26 ozs.: 19.7 gpa.

Table 5.—Reduced Dosage Table for Application of Herbicides to Small Areas

Label concentration in active ingredient or acid equivalent		*Quantity of liquid herbicide product to add to 1 gal. of water to treat 1,000 sq. ft. at rate of 1 lb./acre*		
Per cent.	*Pounds/gal.*	*Ounces*	*c.c. or ml.*	*Tablespoons*
5	0.5	6.2	174	12.5
10	1.0	3.1	87	6.2
20	2.0	1.5	43	3.1
30	3.0	1.0	29	2.1
40	4.0	0.7	22	1.5
50	5.0	0.6	17	1.2
60	6.0	0.5	14	1.0

To apply ½ lb./A rate use one-half the amounts shown in table. To determine quantity of herbicide for rates greater than 1 lb./A multiply the desired rates times the amount shown in the table for the given concentration.

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