Calibration Requires Close Calculation But Gives Uniform Application

Minnesota supt. suggests keeping thorough records on equipment . . . They save time in the long run, help to avoid needless mistakes

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Each piece of equipment should be purchased for a specific purpose or job and, if properly selected and used, will contribute materially to effective operation of the maintenance program. Selection and procurement of equipment are basic to equipment use. Both deserve a great deal of thought and planning. For the purposes of this discussion it will be assumed that the supt. has the necessary equipment to operate adequately.

The size of the operation, the degree of maintenance demanded by the club membership, terrain and landscaping dictate the amount, size, kind and sometimes quality of equipment found on a course. The condition of the equipment is a reflection of the club and the supt. Imagine, your reaction to an orderly shop with sparkling clean, well-conditioned equipment set up for easy access, in contrast to dirty, battered equipment left sitting wherever the last operator could find a place to park it.

Knowledge of Machine

A supt. must know how a machine performs, its limitations, degree of maneuverability, service requirements and most important, its effect on the turf. Further, the supt. must thoroughly acquaint each potential operator with the machine and its routine service requirements. The operator must be trained to observe the results of operation and to report immediately any malfunction of a piece of equipment.

Knowing equipment goes beyond just being acquainted with its mechanical aspects. Equally important is complete knowledge of the operation of the equipment and the effect it has on the turfgrass. Two examples will serve to illustrate this point: tire pressure and calibration of sprayers and spreaders.

Direct, Indirect Effect

Tire pressure is important because of its direct and indirect effect upon grass. The direct effect is the visible damage observed when tires run over grass when it is at or near the wilting point or when it is covered with frost. Direct damage also may be observed when vehicles spin and slide on wet, poorly drained areas. Indirect damage occurs from soil compaction which is directly related to tire imprint and weight.

When buying equipment, be sure to specify the type of tire desired. Avoid narrow high pressure tires with sharp or drastic tread. Fertilizer spreaders and sprayers can be fitted with 8.10 x 15-inch or larger tires to run at an internal pressure of 10 p.s.i. Some supts. use aircraft tires on their industrial type tractors and special turf-type tires on their trucksters. Most golf car manufacturers have recognized the desirability of a broader tire. The type of tire desired varies, but is a function of weight of the machine over the number of square inches of tire actually supporting the machine. A reading of less than 10 lb. per sq. inch is somewhere near optimum.

A check with tire manufacturers indicates that tractor tires that are normally recommended to carry 28-32 p.s.i. air pressure can be run for years on as little as 8-10 lbs. in a typical course operation.

All applications of materials are a function of material per unit of area. Uniform application of chemicals is essential to the

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control of fungi or weeds. A small variation in the rate of application may fail to give desired results or may injure the turf.

A simple method for determining the amount of liquid a sprayer applies per acre is as follows:

1. Start with a full tank of clean water and have the pressure adjusted as you will use it in the field (usually 30 to 40 pounds).

2. Drive exactly ⅛ of a mile (40 rods or 660 feet) in a field at the speed you will use when spraying — usually 4 to 5 miles per hour. Note the RPM and gear used; then keep it at this speed when spraying.

3. Refill the tank, carefully measuring the amount of liquid required.

4. Calculate the application rate as follows:

$$\frac{\text{No. of gals. used} \times 66}{\text{Width of boom (feet)}} = \text{gals. per acre.}$$

Example: If 12 gallons were used in ⅛ mile and the width covered by the boom is 24 feet, multiply 12 by 66 and divide by 24. The result is 33.0 gallons per acre.

Amount of Chemical

Here is how you determine the amount of chemical to be put in the tank.

1. Divide the number of gallons the tank will hold by the number of gallons your sprayer applies per acre. This gives the number of acres one filling will spray.

2. Multiply the number of acres the tank will spray by the amount of chemical to be used per acre. This gives the amount of chemical to be used per tank.

Example: If the tank holds 250 gallons and the sprayer applies 33.0 gallons per acre, one tank will spray 7.6 acres (250 divided by 33.0 equals 7.6). If 1 quart of spray material is required per acre, 7.6 quarts is required for each tankful.

For those who are mystified by the magic figure 66, the formula is based on chain measurement. 40 rods = 10 chains = 660 linear feet — 10 square chains = 1 acre, thus, 660 x 66 = 43,580 sq. ft.

All data should be carefully recorded and filed for future reference. It is essential that pressures and ground speeds be maintained constant for accuracy.

Calibration of "The Man"

The most difficult type of calibration is of the human element where "The Man" must be calibrated. Many courses use the batch method where the number of square feet of the area to be treated is known and "so many ounces" of material are weighed out for that particular area.

A large operation has to be more accurate, however, and calls for a quick, economical application. The reference is to application of fungicides by the use of a "hand gun". In this operation the amount of liquid a sprayer applies per unit of area is as follows:

1. Start with a full tank of water and have the pressure adjusted as you desire (make a note of pressure).

2. Have the employee treat an area where the number of thousand sq. ft. is known (the area should be quite large — 15 to 20 thousand sq. ft.).

3. Refill the tank carefully and accurately, measuring the amount of liquid required.

4. Calculate the application rate as follows:

$$\frac{\text{No. of gals. used}}{\text{1,000 sq. ft. covered}} = \text{gals. per 1,000 sq. ft.}$$

Example: If 108 gallons were used on an area of 18,000 sq. ft., divide 108 by 18. The result is 6.0 gallons per thousand sq. ft.

Fungicide Dosage

Here is how you determine the amount of fungicide to be put in the tank.

1. Divide the number of gallons the tank will hold by the number of gallons your sprayer applies per 1000 sq. ft. This indicates the number of thousand sq. ft. one filling will spray.

2. Multiply the number of thousand sq. ft. the tank will cover by the amount of fungicide desired per 1000 sq. ft. This shows the amount of fungicide to be used for each full tank.

Record and File

Example: If the tank holds 250 gallons and the employee applies 6.0 gallons per 1000 sq. ft., one tank will treat 41,600 sq. ft. (250 divided by 6.0 equals 41.6). If 3 oz. of material is desired for each 1000 sq. ft., 124.8 oz. (7.7 lbs.) would be required for each tankful. That is 3 oz./1000 sq. ft. x 41.6 thousand sq. ft.=124.8 oz. (7.7 lbs.) per tankful.

Of importance in this type of calibration is that all factors remain constant. All figures such as pressure, nozzle size, name of employee, etc. should be carefully recorded and filed. If for any reason a different man is used on a job a new calibration should be performed. If for any reason you believe the employee may be slowing down because of age or fatigue, an equalizing adjustment or re-calibration should be made.

The calibration principle of fertilizer spreaders is equally demanding. The literature that accompanies the conventional type spreader with a calibration pan is more than adequate and will not be elaborated upon here.

Most manufacturers publish a chart, usually attached to the machine, which indicates an approximate setting for pounds per acre. But, because of the extreme variation in material character, moisture content and "flowability", it is impossible for the manufacturer to account for all brands of materials that might be used. A record of each calibration for every material used should be kept.

Cyclone-Type Spreaders

To calibrate a cyclone-type spreader, observe the chart for the approximate setting and speed for a similar material. To be on the safe side, you might set the machine a little lighter than recommended. Then choose an open area such as a practice fairway or rough and proceed as follows:

1. Start with the hopper level full of the desired material (fertilizer in most cases).
2. Drive exactly ⅛ of a mile (40 rods or 660 ft.) at a desired constant speed.
3. Refill the hopper, carefully measuring the amount of material required.
4. Calculate the application rate as follows:

$$\frac{\text{No. of lbs. used} \times 66}{\text{Width of Coverage (ft.)}} = \text{lbs. per acre}$$

Example: If 470 lbs. of 10-6-4 fertilizer were used in ⅛ mile and the width covered by the spreader is 40 feet, multiply 470 x 66 and divide by 40. The result is 775.5 pounds per acre.

The amount of fertilizer to be applied per acre should first be decided. Then after several test runs, the adjustment of the spreader should be determined. Fertilizer does not lend itself to dilution or concentration such as in liquid spray calibration. Be sure to record the settings or adjustments of all trial runs and keep all pertinent data such as analysis of fertilizer, trade name, manufacturer and, above all, ground speed at which the tests were run. Many times it is possible to interpolate the setting of a machine when as few as three test runs are completed. By using the maximum and minimum settings along with the "in between settings" a graph can be plotted showing the pattern of the machine (straight line or curved).

St. Andrews Isn't Golf's Cradle, These People Say

The people of Royal Blackheath in England say St. Andrews isn't the cradle of golf. When King James I and his courtiers tired of stag hunting early in the 17th century, they were persuaded to open a seven-hole course on the sand ground of Blackheath Common, about eight miles from London.

The royal golfers are said to have decided their matches over three circuits — 21 holes. Hockey shape sticks and leather balls were used. King James, whose mother, Mary Queen of Scots, was a golfer (history says she stepped out and took some practice swings shortly after receiving a report that her husband, Lord Dornley, had been murdered) was pretty much of a hacker. It is suspected that his courtiers didn't count all his strokes in order to curry favor with him.

Residents of Royal Blackheath claim King James' golf club was formed in 1608, to be exact. This was 150 years before the Royal and Ancient was organized at St. Andrews. The original course at Blackheath Common disappeared in 1923, giving way to a playing field and swimming pool. The original course moved to a new site, a 17th century manor house, a few miles away. Now, Royal Blackheath has a modern 18-hole course.

Accessory Equipment

Because of the large geographic area in which manufacturers sell and the universal circumstances under which the equipment is used, there usually are a great number of accessories available to adapt a particular machine to its intended use. For example, the nozzles on the boom of most sprayers may be of the wrong gallonage for your situation. A supt. should become familiar with the spacing, angle, gallonage delivered, pressure required, and distance from the ground required, for a specific nozzle. He should become familiar with all the attachments or adapters of his other equipment such as fixed combs, floating combs, Wiley rollers, castor wheels or solid rollers as are offered with his greensmower.

The fundamental of using equipment to its best advantages should not be overlooked. This is not a recommendation to

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Equipment Calibration

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use equipment for purposes other than which it was originally designed. However, occasionally there is a machine, the cost of which cannot be justified by its single design intent.

Observation of Results

Correct use of equipment is noted by the "observation of results". Even though the supt. has read most available literature the fact still remains that a complete understanding of the characteristics of the machine is necessary before it can be used properly.

Height of Cut: — All the books say that bentgrass greens should be cut at 5/16" maximum in mid summer and at ⅛" minimum in spring and fall. The most common way to arrive at this height is to set the mower in the shop by use of an adjustment bar and precision scale. Generally, however, with the same setting on four different greenmowers, there will be four different heights of cut. Starting with manufacturer "A" who manufactures the lightest mower and progressing through "D", the heaviest, each mower will cut propressively lower in proportion to its weight and the many variations in the firmness of the soil, the presence of vegetative matter and the pressures exerted on the supporting medium by the wheels, rollers, skids, etc. Engineers refer to this height as "effective cutting height". A supt. must learn to recognize the "effective cutting height" of his mowers. The "effective cutting height" should be observed on all cutting equipment whether they be fairways, greens or triplex units and adjusted to fit the situation.

Something Gone Wrong

Skips or Incomplete Application: These are evidence of "something gone wrong". A solution can be arrived at much sooner if the fundamentals of the operation are understood and the computations or use factors are re-checked. Physiology of the plant is of prime consideration in trying to arrive at a solution. Many ingenious devices have been invented to prevent "skips" or untreated areas in making fertilizer and chemical applications. Use of a marking device which clearly defines the treated zone is quite essential. Dyes and dragging weights are most commonly used.