How to Set Equipment for Desired Application Rate

By CLINTON K. BRADLEY

LOCAL conditions, type and size of equipment and available labor are some factors in turf treatments. Rates of application depend on the judgment of the man in charge, after considering directions of manufacturers, supply distributors and technical bulletins.

To stake out a squared test area of equal sides containing close to 1000 sq. ft. measure each side 31 ft. 8 ins. Square the corners to a true right angle by measuring back from corner on one line 3 ft., 4 ft. on the other side, then move the line one way or other until the diagonal between these points measures 5 ft. If greater accuracy is wanted use a larger multiple of 3, 4, 5 such as 6, 8, 10 or 12, 16, 20 feet. Test areas are best staked out on level ground, in the "rough," and near maintenance buildings for convenience. Pointed 2 in. x 2 in. Location stakes a foot long, driven below mowing height, and painted a light color on top are easier found when again wanted.

A test acre of 43,560 sq. ft. can likewise be laid out, each side measuring 208 ft. 8½ ins. and squared at corners as previously mentioned. One tenth acre of 4,356 sq. ft. is a convenient test plot when treating large areas, and more on this later.

Some consider an acre as 40,000 sq. ft. for rough figuring. Others, consider inefficiency of spreaders, wheel slippage and mounting totals of error on large tracts; rather work with exact figures to allow for mechanical variances. Most fertilizers are packed in 100 lb. bags now, and fractions of acres are easier figured in decimals (tenths) instead of common fractions as ⅛, ¼, ½, etc. This also applies to spray solutions which are figured on the 100 gallon basis, and made up in percentage strength, or dilution.

Estimating Fairway Area

An "average" 9 hole course has about 25 acres of fairway, and 18 holes between 40 to 50 acres, if width runs about 50 yards (150 ft.) per hole. Some greenkeepers treat a 15 ft. path thru rough in front of tees, and 1 to 3 such widths around outside of greens. This 15 ft. is about the swath cut of a 5 gang mower. A rude "score card" estimation of fairway acreage is 1 acre to each 100 yards of fairway length, if fairways are 50 yards wide. This figures fairly close, if the first 100 yards from each hole is deducted for rough in front of tees.

It is best to actually measure, or pace off each area, and make a record chart for future use. In pacing, there is less effort to take a natural walking step averaging 2½ ft. and count 5 ft. for each two paces, than trying to spread-leg a 3 ft. pace, unless the man is quite tall. A convenient acreage reference table is:

1 acre	43,560 sq. ft.
2 acres	87,120 sq. ft.
3 acres	130,680 sq. ft.
4 acres	174,240 sq. ft.
5 acres	217,800 sq. ft.
6 acres	261,360 sq. ft.
7 acres	304,921 sq. ft.
8 acres	348,480 sq. ft.
9 acres	392,040 sq. ft.
10 acres	435,600 sq. ft.

A paced-off area of 40 to 44 walking steps each side approximates an acre. One needs not be too exacting in this measuring—neither the grass nor the golfers who play on it will know the difference. When fairways are measured, a chart can be made up, listing each hole by played number, the number of 1000 sq. ft. units, and pounds material needed in varying amounts at different application rates. For example: Fairway number 1, containing about 3 acres or 130 area units of 1000 sq. ft. will require 130 lbs. material to treat at the rate of 1 lb. per 1000 sq. ft.—260 pounds material at 2 lbs. per 1000. Working it out to rates up to 10 lbs. per 1000 sq. ft. requires 1300 lbs. For amounts in excess of the 10 pound rate, combine smaller and larger rates, as, for 12 pounds per 1000 sq. ft. add the 260 and 1300 lbs. to total 1560 lbs. To make the chart more universal, omit mention of pounds, and just use the term "rate," and this can apply to ounces, or gallons, as in the use of 2,4-D dosages.

Smaller areas as greens which are usually somewhat circular, can be roughly estimated by taking several diameter measurements, to get an average radius, then multiply this figure by the same and by 3 to get square footage. To keep the areas treated at a constant size, decide to include borders of greens, and take measurements to the crown of slopes. It is well to allow up to 10% extra material

Be sure distributor feeds uniformly

to be brought to each area the first time it is used, and if records are kept of the actual amounts used, this will aid in later treatments of the same material, on that area at that rate.

Charts should be made up in triplicate, at least, in the event that one copy is lost or destroyed. The chart will aid in making up the budget requirements for material, as outlined in the article by T. T. Taylor in June 1946 GOLFDOM. As in the case of fairways, assuming one intends to make two 20 pound per thousand sq. ft. fairway fertilizer applications in the coming season, simply add up all the ten unit rates for fairways, multiply by 4, and the total tonnage can be known.

A point some readers wish clarified is, how many pounds of material are needed to apply a stated pound of plant food element. In one instance, a man read that 1 pound of nitrogen per 1000 sq. ft. per month, during a growing season of 6 months, was a good feeding of this element. It did not seem right to him that only 6 pounds of fertilizer (as he interpreted it) were enough for 1000 sq. ft. or 30 lbs. a year for a 5,000 sq. ft. green; or, for fairways 43½ lbs. per acre of fertilizer a year. Assume the material contains 5% total nitrogen, or 5 pounds in a 100 pound bag. Divide 100 by 5, 5)100(=20, the latter figure being the number of pounds of 5% N. fertilizer needed to apply 1 pound of nitrogen, or, for 6 monthly applications 120 pounds would be required for the season. On the acre basis, 20 lbs. multiplied by 43½ (1000 sq. ft. units in an acre) result in 870 pounds to yield 43½ lbs. total nitrogen feeding per acre for that treatment.

Calibrating or Setting Spreaders

Spreaders in common use are the hopper type with rotating or sliding agitators driven by wheels in ground contact. Other types are powered by hand crank or drive wheels turning fan-like broadcasting blades, and a third is like the first, but mounted directly on the truck or tractor, and is driven by the rear wheels. Discharge openings are regulated by setting a control handle on a notched quadrant, or spacer washers, or stop-screw adjustments are used.

There are two general methods of finding what calibration to set a spreader. If both are used, they can be checked against each other. Assume fertilizer is on hand, but weather or ground conditions are not right for spreading. Raise the spreader on blocks so the drive wheels clear the floor. Lay paper, canvas or empty cloth bags under the hopper. Weigh 1/10 the amount required to treat an acre. This is to assumedly go 1/10 an acre or 4,356 sq. ft. as previously mentioned. Hopper width is 8 feet. What distance must the spreader travel over an 8 foot width to cover 4,356 sq. ft.? 8)4356(=543.25, meaning spreader must travel approximately 544 lineal feet to cover 1/10 acre.

Drive wheel rims are 9 ft. in circumference, as tape measured or with string and yardstick, or figured, circumference is equal to diameter times 3.1416, or say roughly 3 times the diameter, which in this case may be 3 feet across.

How many turns must the wheel make to simulate travel of 544 feet? 9)544(=60 turns approximately. If we wish to apply 10 lbs. material to 1000 sq. ft. or 435 lbs. acre, then 1/10 acre will require 43½ lbs. Weigh out and evenly lay this amount in the hopper. Chalk or string mark a spoke or point on the drive wheel. Open the hopper to a guessed-at setting. Turn the wheel 60 full revolutions. If the material all runs out BEFORE 60 turns are made, stop operations. Close hopper, pick up material and dump it back in hopper. Open discharge plate to a smaller setting. This time, after 60 full wheel turns there is material still in hopper. Pick up that on the floor, dump it back in hopper, and try a slightly larger opening. The third time, after 60 full turns, all material ran out. Close hopper, dump the material back in, open to the last-tried setting, and make a check run. Now we have a setting quite close for

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The right amount will go a long way.

what we need for THAT material, at THAT consistency or graininess, at THAT rate for 1/10 an acre. Drawing the spreader over a full acre at that setting is the same rate.

When weather and ground conditions are right for spreading, take the distributor out to the test field. In the case of an 8 foot hopper, stake out a double strip 16 ft. wide by 272 ft. long. This is better to work with in 2 runs than an 8 foot strip 544 ft. long. The test made in the barn was under "ideal" conditions. Now observe how the determined setting works out under field conditions, and make adjustments accordingly. Frozen or hard ground may cause the spreader to bounce and jar, and run out the material faster, and a greater amount may go on the ground than intended.

The foregoing means also applies to cut-in seed drills. However, wheel slippage may slow down the discharge rate under actual field use, and a larger discharge setting may be needed. When making tests, shut off discharge at the end of the run, so no material is lost when turning around to come back over the adjoining run.

When grass is dormant, it sometimes is difficult to "follow the line" of wheel marks made by the spreader, and a swath marker may be needed. This can be stiff wire attached to ends of hopper to scratch a line, or a 1″x2″ stick about 18″ long with 6 penny nails driven through both sides to make a scratcher. One of these can be attached to each hopper end, using wire, light chain or rope to permit ground drag.

Burlap or canvas shields can be put on wheels if they are the spoke type, and in front of and behind the scatter boards. This helps keep fluffy material from wind blowing. Scatter boards should always be used under hoppers, set at an angle, and some prefer to stud these with nails. The idea is to get the material to fall in a "sheet" rather than in lines, which may later show up in stripes—fertilized and unfertilized lines. Tractor-drawn spreaders are commonly used in the manner of gang mowers, running up and down the fairway length. Some do and some do not bother to shut off discharge in making turns at ends of runs. Where the material being used is very costly, highly concentrated, or careful application is esential, runs are made across fairways, and shut off at turns.

Treating Small Areas

Hand-pushed spreaders commonly used on greens can be adjusted on the same principles as with tractor-drawn spreaders. Popular makes of hand-pushed distributors have hoppers 3 feet wide, with wheels 12″ and 18″ in diameter. Material applications are made in given amounts per unit of 1000 sq. ft. To pass over 1000 sq. ft. a 3 ft. hopper spreader would need travel about 333 lineal feet, or roughly 3,996 inches. Therefore a 12″ diameter wheel would need roll 108 turns, and an 18″ diameter wheel 71 revolutions, to travel that distance. Similar tests can be made indoors to ascertain approximate settings. To save time, one may want to try 1/10 the rate per 1000 sq. ft. or, 100 sq. ft. on like basis of 1/10 acre for larger spreaders. In terms of a 3 ft. wide hopper on 18″ diameter wheels, this would mean 7 revolutions (1/10 of 71 turns for 1000 sq. ft.) in the stationary test. Again it is wise to check the adjustment on the squared test field staked out 31 ft. 8 inches, totaling 1000 sq. ft. As chemical injury is more likely to show up on greens, than on fairways, 10 trips to cover the test field are worth the time involved.

Those who are really fussy about treating greens, use string guides for the spreader operator. This requires a man at each end of the string, which they move while the spreader man is making turns. The men tending the string ends have a yardstick to measure the next setting point. At the end of each day's use of the spreader, a good rule to observe is, "Shake it out, sweep it out, wash it out." This applies especially to such chemicals which may draw moisture, cake, and corrode the spreader.

Hand broadcasting and the use of mechanical sowers carried by the user, requires mostly practice. The main idea is to keep a constant pace—and when using mechanical sowers—a constant hand cranking speed timed to the pace. It's best to work with the back to the wind, throw high and wide, keep the eyes on the job—wear goggles if needed—and disregard the dames playing off the adjacent tee.

"Washing In" Dry Applications

If manufactured fertilizers are used on fairways in light doses in the growing season and applied evenly, there is not much danger of discoloring turf. Should this occur, and there not be a fairway irrigation system installed, there is not much which can be done about it. The next rain usually takes care of things nicely.

Dry applications on greens is another matter. Sometimes, work schedules necessitate doing the job when there is high humidity. In such instance, it is advisable to wash the chemicals off the grass blades and down into the soil. Have men follow up the spreading crew, and have hose already coupled and laid out. A

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to be done, are required. Greenkeeping and club managerial training programs have been approved in some states and in fewer states, pro training has been approved. Illinois is not one of the states that has approved pro training. The Illinois authorities consider that pro training is a matter of perfecting technique rather than one of acquiring basic knowledge which the applicant already has.

Due to the existence of greenkeeper and manager training schools it's usually much easier to get GI benefits in training in these fields than it is in pro golf. The background for study courses has been supplied by colleges. The pro situation apparently is one calling urgently for national PGA action in formulating and supplying to regional PGA organizations plans for pro training programs meeting the requirements of all state GI training authorities.

Setting for Application

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washing nozzle can be made of a piece of pipe fastened on one end, and threaded on the other to take a female hose connection borrowed from a sprinkler.

The flat water stream from the nozzle is pointed down and about 6 feet ahead of the operator. Best to have the man start at the lower end of the green, working across, and moving backwards. Also keep the hose in back of the man to avoid dammed-up water, and "hose burn lines." Keep the nozzle moving from side to side, and when the water "shines" on the turf, move on. Avoid flooding to the extent that the water begins to make puddles, or flow on the surface. A second going over is advisable, and sometimes, couple up a sprinkler and let it run awhile after washing. To the golfer who gripes about the water spoiling his putts, tell him you are trying to avoid a reverse osmosis condition, and send him off muttering in his beard.

Let Us Spray

Liquid applications can be made with hand watering cans, barrel carts, syphon proportioners, manual or power sprayers. We shall skip discussion on the use of hose and chemical cartridge nozzles for golf use.

The main points to consider are gallons applied per given area, in width by length in feet traveled per minute. It's best to find out by using plain water, colored by a small amount of lime or turf fungicide dye, on the test area. Regulate travel speed so that discharge is about 5 gallons per 1000 sq. ft. or roughly 200 gallons per acre. Then make up solution

strength or percentage to meet the desired application rate. Charts prepared by Dr. James Tyson of Michigan State College will be found useful for 2,4-D and other materials.

Preferably, solutions made up with diluted liquid chemicals, should be sprayed on with coarse droplets, at low pressure, and dry chemicals in solution at higher pressure. Figure low pressure from 100 pounds and down, and high pressure from 200 pounds and up. Nozzle discs are made with various sized openings. At a given pressure, the smaller openings will give a finer spray or mist. Hole in disc size is indicated in 64th of an inch diameter, by number, as, number 4 disc is 4/64th inch opening (or 1/16th inch) number 8 disc is 8/64th inch, or 1/18th inch oriface.

In acreage spraying with tractor-drawn equipment, a good operator can keep his travel speed fairly constant; especially if tractor engine is equipped with mechanical governor. A forward speed of 1 m.p.h. is equal to 88 ft. per minute; 2 m.p.h. 176 ft.p.m.; 3 m.p.h.—264 ft.p.m. The latter is considered a good walking gait. If a check is desired on forward speed, this can be done with a Stewart-Warner Bitumeter as used on road tarring tank trucks, or use some makes of bicycle speedometers, geared to a 5th wheel, or a tachometer (R.P.M. counter) with feet per minute adapter wheel, turned by tractor wheel outer tire circumference.

The How of Turf Treatments

These are Montgomery Ward catalog items 87 L 2965, and 87 Y 2947; total price $2.25 plus postage for 1 pound shipping weight. Mounted with home-made clamps, the device can be set to bear on the smooth tread part of tractor wheel where readings can be seen. Fairway lengths can be measured by getting the tractor up to speed and using a stop watch to time feet traveled in minutes and fractions.

A good time to do fairway fertilization is in the late fall, before winter sets in. The ground is firm and not soggy from thaws as in the spring, there are more calm days, men can work with protective clothing, there is little play interference, and fertilizers will work down to grass roots, with little if any leach loss through the winter. There is no hurry to get the work done as in spring, the rush of deliveries is avoided, and groundsmen have a job to fill in the time gap between the end of course routine and winter work.

Any Changes in Your Operating Personnel?
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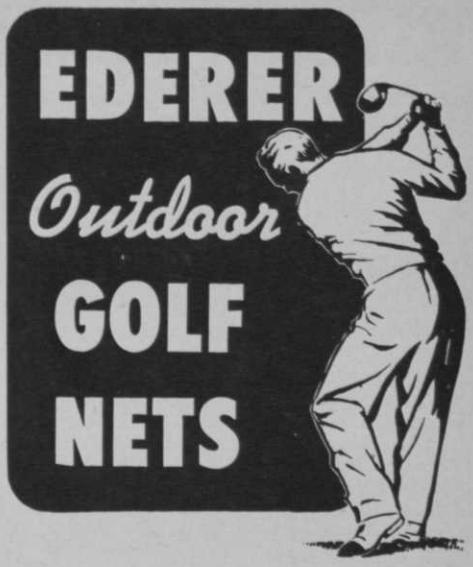

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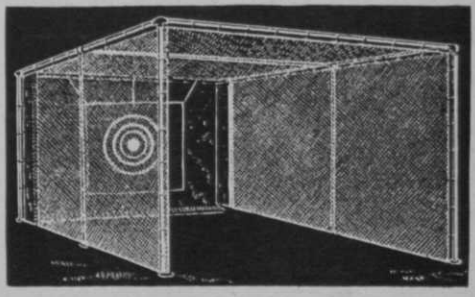

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