putting greens of many courses. The trend is toward the fine, white, soluble powder that can be used perfectly with other nutrients suspended in water or dissolved in the spray tank. Convenience of application of the powdered form of potash through the spray tank, alone or in combination with nitrogen or sulfate of iron (powdered, if you please), tends to rule out the crystalline form which dissolves slowly and often clogs the sprayer.

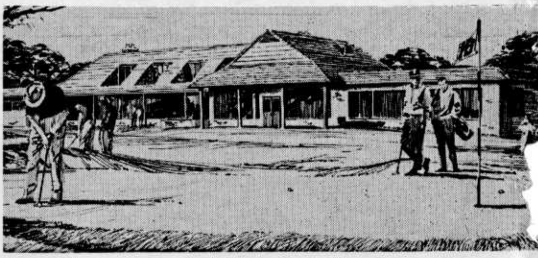
Some ask, "Why sulfate or potash? What's wrong with muriate?" The answer is, "Nothing, but the sulfate form provides sulfur(s) which is another nutrient for bacteria and for plants". In the modern concept of nutrition of turfgrasses, we are committed to providing the best balance possible.

To some it may seem that there is undue emphasis on nitrogen and potash. The reason is that there has been unwarranted use of phosphates to the point where the high levels of P in turf soils only add to the difficulties of producing high-quality turf. Excess P encourages coarse stemmy growth and heavy seedhead formation. Excess P precipitates iron in the transporting vessels inside the plant. Clogged tubes are unable to move nutrients properly from leaf to root and vice versa. Potash, in balance with nitrogen, helps to unclog the tubes and let the nutrients flow as they should. Potash further aids in producing stiffer stems and blades which can take traffic better. Plants supplied adequately with potash have greater disease resistance.

A reasonable balance over a wide area seems to be about 3 N or 4 N to 1 K. For each 3 or 4 pounds of actual N used, one pound of actual potash (equivalent to 2 pounds sulfate of potash) provides an excellent balance. If soil tests show P to be medium to high there seems to be no need for additional phosphorus.

Practical Mathematics for Maintenance Men

The first order of importance in golf maintenance work is that of accurate measurements. Many reliable recommendations have fallen flat simply because turfgrass areas were not known accurately. Most rate recommendations are given for 1,000 sq. ft. (written as M^2) or for an acre. It would be extremely helpful if every supt. would mark off with an edger an area 20x50 feet or 25x40 feet for every man on his staff to study and remember.



The 18th green and clubhouse of the new Prestwick CC, located 20 miles southwest of Chicago's loop, is shown in this sketch. Lawrence Packard designed the 6,500 yard course and Bertram A. Weber was the clubhouse designer.

If a green contains 7,000 M^2 it should be treated for precisely this area. There really is no excuse for not knowing exactly the size of every green and every tee.

We were impressed recently when we were discussing a program with a green chairman and a supt. In answer to the question, "How many acres do you have in mowed fairways?" we immediately got the reply, "41 acres". How refreshing it was, and how simple it was to state exact quantities needed.

Another point of practical mathematics is the simple problem of calculating the season's nutrient requirements. For the sake of simplicity in the example we will set up nitrogen requirements only although other nutrients can be figured just as easily.

An 18-hole course usually has the equivalent of 20 greens which includes the nursery and practice green. If greens average 6500 sq. ft. there will be a total of 130,000 sq. ft. If the greens are bentgrass and require 9 pounds of N/M^2 for the season, the total for greens will be 130 x 9 = 1170 pounds N. This figure will be higher for Bermuda greens.

Tees may be somewhat smaller than greens. For example, we will say a total of 100,000 sq. ft. which require 6 pounds N/M^2 for the season or 100x6 = 600 lbs. N.

Fairways may be bent, Bermuda or bluegrass. Just as an example we will take a low figure of 4 pounds N/M^2 for the season and assume that there will be 45 acres. There are 43,560 square feet in an acre. 43.56x4 = 174.24 or, in round figures, 175 lbs. N/A. For 45 acres we need 45 x 175 = 7875 lbs. N for the season.

We have figured nothing for lawns, roughs or other areas. These can be calculated the same way.

To figure our total requirements we add

1170
600
7875

9,645 lbs. of N needed for greens, tees and fairways for one season.

The next step in our practical mathematics is to convert pounds of N to tons of fertilizer before we can go to the chairman with a program.

A fertilizer that contains 5 percent N will carry 100 lbs. of N in one ton.

$$2000 \times .05 = 100$$

a 10 percent product carries 200 lbs. of N in a ton

$$2000 \times .10 = 200$$

a 20 percent product carries 400 lbs. of N in a ton

$$2000 \times .20 = 400$$

a 38 percent product carries 760 lbs. of N in a ton

$$2000 \times .38 = 760$$

a 45 percent product carries 900 lbs. of N in a ton

$$2000 \times .45 = 900$$

Let's now see how many tons of each product are required to yield the 9,645 pounds of N we need on our 18-hole course. By simple division:

5 percent product:
$9645 \div 100 = 96.45$ tons
10 percent product:
$9645 \div 200 = 48.22$ tons
20 percent product:
$9645 \div 400 = 24.11$ tons
38 percent product:
$9645 \div 760 = 12.7$ tons
45 percent product:
$9645 \div 900 = 10.7$ tons

Now we know exactly the number of tons of the material of our choice that we must buy to get the N we need for the results we want. Next, all that needs to be done is to multiply tons x cost per ton and we get the figure we must match against the budget allowance.

The Art of Composting

There seems to be a general increase of interest in topdressing. The folly of mechanically mixing sand, soil and organic matter was dramatically demonstrated at a recent Penn State field day. Freshly-mixed materials, not composted, which were applied as topdressing failed dismally. The organic material floated, the soil entered the turf, and the sand was left on top as a layer.

Composting seems to be a lost art. Time was when alternate layers of sod, lime, soil and organic materials were stacked high and allowed to "ripen" for a year. Cutting down the face and turning the pile mixed the materials. Another year in the pile, with more turnings, developed a homogeneous top-dressing or compost which was a soil and not just a mechanical mixture of ingredients.

Here is a worthwhile suggestion for modern-day composting in an open bed with minimum labor and maximum soil-building and aggregation of particles. In an open outdoor bed blend thoroughly 12 inches or more of a preferred topdressing mixture of sand, soil and organic materials. Lime to pH 7.0 and incorporate adequate P and K (25 lbs./M^2 of 0-20-20 or 0-25-25 is suggested as a starter) to full depth. Now plant Penngift crownvetch seed, freshly inoculated, at one pound to 1,000 sq. ft. (no more!). Allow the crownvetch (a deep-rooted, perennial legume) to grow unmolested for at least two years. One or two clippings the first year is permissible if weeds are heavy. Allow the cut weeds to lie on the ground. An occasional deep irrigating is permissible if needed.

This method of open-bed composting saves labor and achieves maximum soil-building through the great root system and the nitrogen gathering ability of the crownvetch. When compost is needed simply plow and screen for well-aggregated topdressing that is full of life.

Harold Reed (r) played the season's 50,000th round in mid-November on Royal Oak (Mich.) GC. He is shown with Don Soper, PGA pro who built the 9-hole muny course in 1961-62 and operates it on a 20-year lease arrangement.

Buyers' Guide • P 127