

Clipping Tests As Greens Fertilizing Guide

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DURING the Midwest Greenkeepers short course at Purdue university, February 26-28, 1945, the writer described the methods used in fertilizing and aerating the greens at the Elk's CC, Lafayette, Ind. Since then requests have been received for additional information. The following outline of the methods used is offered, not as any official recommendation from Purdue, but merely as a convenient reference for the possible guidance of others who may wish to try the treatments on their own golf course.

It was pointed out that the fertilization of golf greens required much more care and effort than fertilizing fairways or even the tees. The grass on the greens is kept trimmed very short in comparison to that on the fairways. The clippings are removed from the greens and this represents a constant loss of fertility while they remain on the fairways to decompose and maintain the fertility. Because of this treatment of the greens turf which keeps the plants relatively small in size, the nutrient relation between the grass shoots and roots is much more delicately balanced than what occurs in fairway grasses where larger growths of leaves can provide more nourishment for larger root systems. Accordingly, the diminutive grasses on greens should be fed frequently with properly balanced supplies of fertilizing nutrients. All precautions must be taken to not over-feed or damage the grass in any way with the applied chemicals. The method used for the past several years at the Elk's CC has been to apply fertilizing materials only when dissolved in water and sprayed under pressure from a tank onto the greens and washed in immediately.

Tests on Clippings Guide Treatments

The amounts and kinds of fertilizing materials for each treatment are determined by rapid chemical tests on the grass clippings. By this procedure any approaching deficiencies of nitrogen, phosphate and/or potash are detected long before any deficiency symptoms appear. The fertilizer treatments are thus adjusted to the immediate needs of the grass at all times during the entire growing season.

After this system of fertilizing greens is once established, the time required for

making the chemical tests of the clippings is very short. Samples of clippings from two or three greens will suffice unless some special problems, such as drainage, shaded locations, and others, may offset the usual routine on certain greens. The clippings are tested weekly as a routine practice.

At the Elk's course it requires the time of two men for four hours to fertilize 18 playing greens and one practice green by this method of fertilization. Dependent on the results of the tissue tests, the greens are fertilized every eight to fourteen days during the season.

Chemicals Required for Testing

The chemicals supplied in the Purdue Test Kit* are used in testing the grass clippings for nitrate, phosphate and potash. The technique however, which is used at the Elk's course and described in this article requires the use of small bottles with droppers for convenience in making the tissue tests. Obtain four one-ounce dropping bottles and transfer the Purdue Phosphate Reagent No. 1, the Potash Reagents No. 1 and 2 respectively to these dropping bottles. The nitrate-test solution already is in a dropping bottle. Then place approximately one-fourth of the phosphate-powder reagent, No. 2 into one of the bottles (1 oz.) and dissolve the powder in distilled water.

You will then have the following test solutions in dropping bottles for convenient use:

1. Nitrate Test Solution (Diphenylamine in sulphuric acid).
2. Phosphate Test Solution (1—Molybdic-acid extracting solution).
3. Phosphate Test Solution (2—Dissolved powder—stannous chloride).
4. Potash Test Solution (1—Cobaltinitrite solution).
5. Potash Test Solution 2—Ethyl alcohol).

In describing the methods used for making the various tests, the solutions will be referred to by the numbers above. Label your dropping bottles to coincide

*Test kits at \$10 each can be obtained from the Agronomy Department, Purdue Agriculture Experiment Station, Lafayette, Ind. Would suggest ordering an extra package of filter papers and six extra dropping bottles.

with them. (The procedures for preparing these solutions are described in Purdue Circular No. 204, "The Use of Rapid Chemical Tests on Soils and Plants As Aids in Determining Fertilizer Needs", April, 1939, by Thornton, Conner and Fraser.)

Chemical Tissue Tests

The tests for nitrates, phosphates and potash are made on filter paper into which the juice from the clippings is pressed. Filter papers are available that have been specially treated so that when used for nitrate and phosphate tests, *low* and *high* check readings on the lower part of the paper can be compared to the results above on the juice-saturated areas of the paper. If the tests of the juice show *low* or *none*, the need for fertilizer treatments is indicated. If the test for either nutrient is *high*, the supply of that nutrient is adequate for the time being.

Prepare the filter papers by placing clippings from the green to be tested onto the papers as shown in Fig. 1.

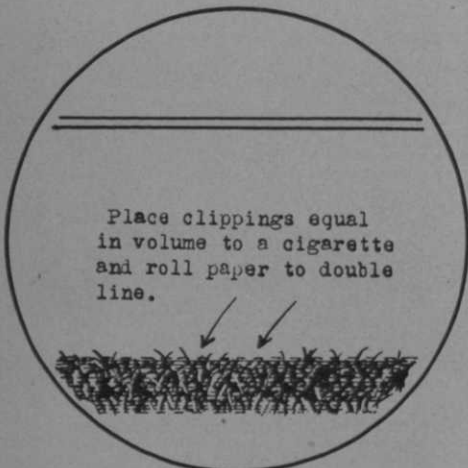


Fig. 1. Use the specially prepared filter paper for first series of tests. Later on regular filter paper may be used after operator is acquainted with the test readings.

Roll paper tightly around the clippings up to double line and with pincers squeeze the juice into the rolled paper. Unroll and discard the crushed grass tissues. The tests for nitrates, phosphates and potash may be made at once on the paper, or the filter paper may be dried and the tests made later on. (In this latter case it is necessary to label the filter papers correctly, so that the interpretation of the nutrient status of the grass on each green tested can be made.)

Tests for Potash

The test for potash is made first because it is necessary to use samples of the paper for this test. With a suitable paper punch take samples from the wet-

ted areas of the filter paper and use them for the potassium tests as follows:

Place the paper plug on a glass slide or clear glass plate

- a. Add 1 drop Potash Test Solution No. 4 to plug. Allow plug to become thoroughly soaked.
- b. Then add 2 drops Potash Test Solution No. 5—Hold slide or glass dish over a dark surface and note any yellow cloudiness or turbidity in the mixture.

Interpretation of Potash Tests

- a. If the solution remains clear—*potash is needed by the grass.*
- b. If the solution becomes cloudy, the supply is adequate for time being. A faint cloudiness means an approaching deficiency of potassium in the grass.

Treatment:

If potassium is needed apply at the rate of 2 pounds of 60 percent muriate of potash per 1000 sq. ft. for the initial treatment. (At the Elk's course 4 to 6 pounds dissolved in 125 gallons water is used for 12,000 sq. ft. green surface to maintain the potash supply in the grass. Usually the first fertilizing treatment consists of ammonia sulphate alone.)

Test for Nitrate

After sampling the paper for the potash test, hold paper vertically and drop Nitrate Test Solution, No. 1, on area (1), and let it run down sheet through the parts marked *Low* and *High*.* See Fig. 2.

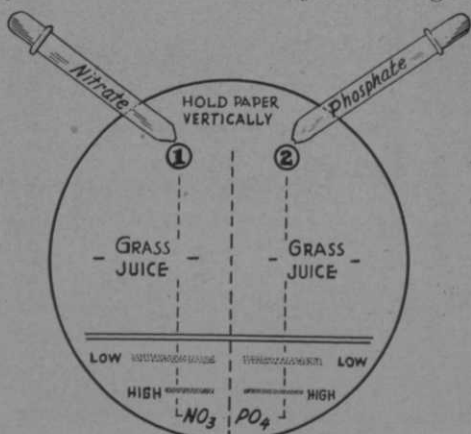


Fig. 2. Shows specially treated filter paper to demonstrate high and low nitrate and phosphate test results.

Note immediately whether any blue color develops on the paper wet with the

*These specially prepared filter papers for the high-low nitrate and phosphate-test readings can be obtained from the Agronomy Department, Purdue Agricultural Experiment Station, Lafayette, Ind.

grass juice, and if so, compare it with the *Low* and *High* check test strips below. (Caution: The nitrate test solution is concentrated sulphuric acid and is very destructive to clothing and shoes, etc.)

Interpretations

If the test shows a *high* test for the juice-saturated paper the nitrogen supply in the grass is adequate—and no nitrogen fertilizers need be applied while these high tests are obtained. Possibly the phosphate and/or potash supplies may be low and should be corrected first.

Treatments:

If nitrogen is needed, as shown by low or negative tests, use 20 pounds of ammonium sulphate dissolved in 125 gallons of water, an amount sufficient for three greens, approximately 12,000 sq. ft.

Suggestions:

If ammonium sulphate is not available, substitute ammonium nitrate, and use 10 lbs. per 125 gallons. If neither of these is available, dissolve what you can of 100 lbs. of 10-6-4 in a 50 gallon barrel. Add 25 gallons of clear solution to tank and fill up to 125 gallons. Spray at the same rate, 40 gallons per green, and washed in. This treatment may suffice for phosphate and potash as well.

Subsequently routine nitrate tests on the clippings will show the adequacy of any of these treatments. Repeat treatments when clippings give tests for low nitrate.

Supplementary Tests for Nitrates

Another convenient test for nitrates and which eliminates the use of the sulphuric acid-diphenylamine mixture, is made by using the Nitrate Test Powder, prepared by Dr. R. L. Bray, of the University of Illinois, and sold by the Urbana Laboratories, Urbana, Ill.

Test Technique

Place a few clippings on center of 3 inch filter paper and cover with small quantity of test powder. Fold paper three times over the clippings, squeeze paper and clippings with pincers. Unfold, and watch for the development of a pink to red color. Slight pinkish color denotes *low* quantity of nitrates in grass. (Nitrogen fertilizer should be used.) Red color denotes ample nitrogen supply for the grass.

Test for Phosphate

After making the test for nitrate and recording the results, apply several drops of Phosphate Test Solution, No. 2, at (2), Fig. II—let the solution run on down through the double lines across the treated strips, then follow with several drops of Phosphate Test Solution, No. 3, over the same path. The development of a

blue color indicates ample phosphates in the grass juice. If the juice test coincides with the *high* check test below the double lines, the grass is well supplied with phosphates. If not, a phosphate carrier, such as ammophos, 20% or 45% superphosphates should be included in the next fertilizer treatment of the green. Suggestions:

Place content of an 80 pound sack of either 20% or 45% superphosphate in a 50 gallon barrel and dissolve what you can in water. This solution then contains either 16 lbs. or 36 lbs. of phosphoric acid, dependent on kind of superphosphate used. Add amounts to spray tank, so as to supply four pounds phosphoric acid per 1,000 square feet green surface. Usually two of these treatments per season is sufficient. The phosphate should be included with the nitrogen and/or potash applications if either one or both are needed. Another suggestion would be to add the phosphate to an organic nitrogen compost.

Resume of Tissue Tests

The tissue tests above described will indicate whether or not, nitrogen, phosphate and/or potash is needed by the grass tested. Whenever the tissue tests are low or negative, for any one of the above nutrients, immediate applications of the nutrient or nutrients should be made so as to prevent the incidence of the starvation conditions which favor some of the fungi attacking malnourished grass. If all of the nutrient tests are *high*, the applications of fertilizer may be delayed until the routine tests show an approaching deficiency of any one of the nutrients. It requires but a few minutes to make the tissue tests to keep a check on the needed nutrients. These tests should be made once a week as a routine practice.

The grass on greens should always be vigorous and kept in the best of health. This insures a favorable situation for insect control treatments and quick recovery from insect damage. It guarantees quick adjustments of the grass when composted.

However, it must be added that the fertilization of greens grasses does not correct the concurrent troubles resulting from poor drainage, a poor subsoil for the greens, nor the troubles resulting from inadequate air drainage. Some greens, surrounded by water hazards may be subjected to a too-high water table and difficulties with the aeration of the roots may develop at times during the season. When all these physical factors are favorable, the fertilization of the greens becomes a routine practice.

(To be concluded in the May issue
of GOLFDOM)