Fertilizer Tests and Trials...Plant Nutritional Requirements

THE majority of grass fertilizer trials conducted by agricultural workers, have been on haylands and pastures, where plant food losses are accentuated by grazing or by removal of hay or clippings. Clovers are highly prized, so the use of potash, phosphate and lime are stressed. On pastures rapid growth and heavy yields lengthen the pasture season and increase the carrying capacity for grazing. Before attempting to follow approved agricultural practice, it is well to analyze fundamental differences between pasture and fine turf management.

CLIPPINGS SUPPLY PHOSPHORUS AND POTASH: Fairways are never cropped and upon decay of clippings, phosphorus and potassium are restored to the soil. This minimizes need for these elements. Golfers look upon clover with disfavor, so practices which accentuate clover should be avoided. This means just enough potash, phosphate and lime, to satisfy the turf's need for these substances. On fairways rapid growth and heavy yields only necessitate more frequent mowing; a slow but continuous growth is far nearer the ideal.

Quick acting nitrogen is used on pastures to insure rapid and heavy initial growth, whereas on fairways slower acting organic nitrogen is desirable.

Fertilizer trials on new seedings are misleading guides for the fertilization of established grass, because phosphate is imperative on new seedings, but nitrogen is the important element on established grass. On phosphated plots, the superior turf following seeding may continue for several years due to more complete initial coverage. This demonstrates the importance of phosphate on new seedings, but does not prove that it must be used continuously thereafter in large quantities.

CHEMICAL TESTS LIMITED BY IMPERFECT TECHNIC: There is a tendency to place undue emphasis upon the value of chemical soil tests, particularly the new rapid methods. This is true of some technical workers as well as fertilizer salesmen. These methods have a promising future, but their present usefulness is limited by imperfect technic, and for lack of definite correlation with field experience. Until this has been accomplished, indiscriminate testing should be avoided. Aside from acidity, determinations should be made by an experienced operator capable of interpreting the findings.

Except in rare instances, soil treatment simmers down to possible need for lime, and one or more of the elements nitrogen, phosphorus and potassium. With lime there is no essential difference between new seedings and established turf, but in fertilizer usage a sharp distinction exists.

SOIL REACTION KEY TO LIME USAGE: Soil reaction is the guiding principle underlying lime usage, so its determination is a necessity. Fortunately these determinations can be made on the grounds with one of the inexpensive kits now on the market.

Until more precise information is available, it is safe to forego lime applications unless soil is more than slightly acid. Where the reaction range is pH 5.5 to 6.0, no harm will result from a season's delay. In the interim the effect of lime can be tested on trial strips.

Benefits from lime are most noticeable during mid-summer. Excessive acidity intensifies summer injury. Where needed, lime is best applied during late fall or very early spring. When phosphate must be used also, liming should precede its application by several months if possible.

Contrary to general belief, it is not necessary to add sufficient lime at one time to raise the reaction to neutrality or even to pH 6.0. To attempt such procedure on very acid soil, may actually retard rather than benefit growth. Moderate liming at more frequent intervals so as to change the reaction gradually is more sensible. Except in these rare cases, applications every two to four years should suffice.

TURF NUTRITIONAL REQUIREMENTS: Even the supposed specialist often overlooks the marked difference in the nutritional requirements of new grass seedings, and established turf. Abundant phosphate is the first essential for new seedings; but for established grass, fertilization must be built around nitrogen, the growth producing element, with phosphoric acid and potash occupying minor roles in the order named.

The same nutritional requirements govern the improvement of thin grass as are required to maintain good sod. The difference lies in the amount of fertilizer required and in the frequency of application. Annual fertilization at moderate rates, may suffice to maintain a good grass sward; but on poor turf heavier rates, both spring and fall, are imperative to encourage existing grass to spread and produce desirable coverage.

The A B C of TURF CULTURE

Mention has already been made of the fact that nitrogen is the dominant need on established turf. The safest criteria for determining quantity needed, are general turf vigor and kind of soil. Heavier rates are not only justified but essential where turf is sparse with moss, clover and weeds prevalent. Larger amounts are needed on sands and on light colored heavy soils, than on those of dark color. Type of fertilizer also affects rate. Organics can be applied in generous quantities, but with soluble fertilizers more frequent and lighter rates are necessary to avoid burn and prevent too heavy initial growth.

Nitrogenous fertilizers can be applied in spring or fall, but in crab grass regions major applications should be in the fall.

PHOSPHORUS OF SECONDARY IMPORTANCE: Most soils contain less phosphorus than nitrogen or potassium, which is the principal reason why phosphates are prime ingredients of farm fertilizers. Nevertheless there are sound reasons for placing phosphorus second to nitrogen in the scheme of fertilization on established grass, especially where clippings are not removed. Since no crop is removed, actual loss of phosphorus is negligible.

As previously pointed out, phosphorus, unlike nitrogen, is fixed in the soil and not lost in the drainage water. In farm practice, mechanical penetration of applied phosphate naturally follows soil manipulation by cultivation and plowing. On grassed areas this is impossible, so applied phosphates usually are fixed very near the surface.

In those cases where phosphorus is badly needed, it is sound practice to make generous initial applications which need not be repeated often. There is no loss from leaching, and deeper soil penetration is more likely than from light yearly applications.

POTASSIUM ALMOST NON-ESSENTIAL: Except for peats, mucks, and sands, potassium can be disregarded as non-essential. The average loam soil contains abundant potash, which is constantly augmented upon decay of clippings; and leaching loss is negligible also. In the rare instances where potash is needed, it can be applied in fair quantity every second to fourth year.

Greens fertilization is very similar to fairway practice, except that it is complicated by the removal of clippings. This tends to accentuate need for phosphorus and potassium. Then, too, growth is maintained on a higher plane by heavier watering.

CONSTRUCTIVE FERTILIZER PROGRAM: The fertilizer program should be built along the following lines: Use moderate quantities of phosphate and potash in the spring and fall. Major nitrogen feeding should occur during these seasons also, but rates should gradually decrease with the approach of summer to keep the turf sturdy. In hot weather just enough nitrogen should be used to maintain color and growth. This generally prevents disaster, minimizes disease and other related troubles.

It is generally believed that two to three years are required to develop good sod from seed. Failure to supply needed plant food is responsible for this erroneous opinion. Actually it is easier and certainly less expensive, to obtain a good initial stand of grass than to attempt improvement later.

The first six weeks following seeding tells the story. The small grass seed contains only enough stored food to initiate growth, so a good stand of grass is obtained only when the soil is charged with sufficient available food to sustain uninterrupted growth.

With fall seedings, fertilization hastens turf development so winterkill is unlikely; with spring seedings, feeding insures sufficient early growth so the young grass can withstand withering summer heat.

SOIL NEEDS: For satisfactory results, the soil should not be too acid, especially for Kentucky blue grass; the supply of available phosphoric acid should be generous to stimulate initial root development; ample nitrogen is needed to promote leaf growth; but potash is usually unnecessary.

Superphosphate is a better source of phosphoric acid than bone meal because of its greater solubility and availability. It should be used generously for two reasons: to promote root development, and secondly, because this is the logical time to build soil reserves, and is the last opportunity mechanically to incorporate phosphate with the soil.

Organic fertilizers are the ideal source of nitrogen for new seedings because they are less apt to injure the young seedling than soluble fertilizers.

(To be continued)

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