



The control of clover and buckhorn plantain in old established Kentucky bluegrass turf by the application of fertilizers. The weed-free plot on the right had received a 9-9-4 inorganic fertilizer every spring and fall from the spring of 1934 to the spring of 1938, inclusive, at the annual rate of 2.5 pounds of nitrogen to 1,000 square feet. The picture was taken in June, 1938. The plot on the left in which clover and plantain predominate had received no fertilizer during this time.

and fertilizers had a better stand of bluegrass than those to which fertilizers alone were applied.

SUMMARY

The results of a number of experiments with fertilizers chiefly on old weedy turf composed largely of Kentucky bluegrass have been reported. These experiments were conducted in part at the Arlington Experiment Farm and in part on the grounds of the Capital Golf and Country Club near Washington.

In these experiments a thin weedy turf was transformed into a dense turf free of weeds in two years by moderate fertilization without the use of seed, water or mechanical working. The transformation was even more rapid with extremely heavy applications.

The best turf on the acid soil was produced with a combi-

nation of nitrogen-phosphorus plus calcium. However, the turf produced by applications of a complete fertilizer plus lime was almost as good.

The turf which received the nitrogen-phosphorus combination or the complete fertilizer was about equal on the neutral soil.

Nitrogen applied alone produced some improvement in the turf. However, a good turf resulted only when nitrogen was combined with certain other elements.

When nitrogen was combined with phosphorus there was a decided increase in turf grasses and a decrease in clover. There was no apparent difference in results on the neutral soil when potassium was added to this combination. However, on the acid soil the addition of potassium resulted in a pronounced decrease in turf grasses and a corresponding increase in crabgrass.

The addition of lime to the nitrogen-phosphorus combination on the acid soil effected a further reduction in turf weeds and crabgrass but clover was encouraged. When lime was added to the nitrogen-phosphorus-potassium combination turf grasses were likewise decidedly increased and crabgrass was again decreased. The lime seemed to have overcome the apparently detrimental effect of the potassium on the acid soil.

Nitrogen-potassium, nitrogen-potassium-calcium, and nitrogen-calcium produced no better results than nitrogen alone on these soils. The latter two combinations, however, effected an increase in the amount of clover which ultimately improved the turf to some extent.

The addition of phosphorus alone was not effective in improving the quality of the turf. Nevertheless it was necessary

to include phosphorus in all of the combinations before good turf could be produced.

Phosphorus and potassium, phosphorus and calcium or a combination of these three elements were not much superior to phosphorus alone. These combinations, however, encouraged the growth of clover which eventually resulted in some increase in the amount of turf grasses.

Potassium was found to be of little value on these soils whether used alone or in combination with other nutrients. Its application on the acid soil checked the beneficial influence of other nutrients and produced a poorer turf with a greater increase in crabgrass than the same nutrients used without potassium. The addition of calcium, however, overcame some of the apparently detrimental effects of the potassium. On the neutral soils the depressing effect of potassium was not so plainly evident, the nitrogen-phosphorus-potassium combination producing turf about as good as the nitrogen-phosphorus combination. To obtain a high-quality turf on these types of soil it apparently was not necessary to include potassium in the fertilizer combination, and certainly not in such amounts as occur in most grades of fertilizers that are recommended.

The application of lime alone produced no immediate improvement in the turf. Clover was encouraged, however, and this in the end tended to stimulate the turf grasses. On the acid soil, when lime was added to any combination containing nitrogen it produced a striking increase in the amount of turf grasses the first year. Unless, however, phosphorus was included in such a combination the amount of turf grass at the end of the 5-year period was less than at the end of the first year. It was necessary to add lime on the acid soils before turf of high quality could be produced.

The use of 1,000 pounds of lime per acre annually on the inorganic fertilizer plots had little effect on the soil acidity.

When applied on an equal nitrogen basis all inorganic complete fertilizers of different formulas produced about the same results. The ones supplying the greatest quantity of phosphorus encouraged larger amounts of white clover. When these complete fertilizers were used, a good turf was obtained at the least expense with a formula supplying a high percentage of nitrogen, about half as much phosphoric acid as nitrogen and decidedly less potash than phosphoric acid.

Inorganic and organic fertilizers gave equally good results when repeatedly applied at heavy rates. Inorganic fertilizer produced a turf with fewer weeds and clover when light annual applications were continued over a period of years.

Inorganic fertilizers produced as great an increase in soil organic matter as did the organic. Both fertilizers increased the soil organic matter by approximately 5.5 tons to the acre. The increase was due to the vigorous growth of the grass roots and decay of other plant parts and not to the material added as fertilizer.

Of the various rates of application tested, the best turf maintained over a long period of time was that obtained by a heavy initial application of a complete fertilizer, followed by light annual applications. Equally good results were obtained by applications of a complete fertilizer every spring and fall at the rate of 1.25 pounds of nitrogen to 1,000 square feet, a total annual application of 2.5 pounds.

In single applications heavy rates resulted in the greatest improvement in the turf, although there was some burn. A mixed fertilizer, even when used at the extreme rate of 8 pounds of nitrogen to 1,000 square feet, improved the condition of the

turf. However, repeated applications at such heavy rates resulted in a deterioration of the turf.

Although the best turf was obtained by continued applications of fertilizer, several heavy applications resulted in a turf which is still remarkably good even though several years have elapsed since the last application was made.

In the Washington district best results were obtained with fall applications of fertilizers. Spring applications, unless made very early, stimulated the crabgrass which then crowded out the bluegrass. When only spring applications were made the best results were obtained if they were made very early and at about half the rate of the fall applications.

The liberal use of fertilizers was effective in reducing the amount of weeds, especially plantains, chickweed, selfheal and clover. When applied at the lighter rates, the inorganic fertilizers were much more effective than the organic.

Arsenicals applied in addition to the fertilizers resulted in a quicker and greater reduction of turf weeds than did fertilizers.

“Be not the first by whom the new are tried
Nor yet the last to lay the old aside.”

Pope referred to the use of words, but the idea conveyed is of wider application. The advice is good but does not mean that new ideas should be avoided. Try them out carefully but until the new method has been proved stick to methods that have been found successful. But don't stick to old ways long enough to fall behind the times. Changes of program should be made only with a clear view of the results that may be expected. There is no sense in trying anything and everything.