

## REMOVING CLIPPINGS REMOVES NUTRIENTS

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When clippings are removed from turf it is obvious that nutrients are removed as well. Even when clippings are returned, there is need to provide considerable amounts of nutrients, so when clippings are removed the need for nutrients will naturally be increased.

In a study conducted at Michigan State University several years ago in cooperation with Dr. James Beard (1) the nutrient uptake in the clippings of Toronto creeping bentgrass grown under putting green conditions was determined. The total annual removal in pounds of nutrient per 1000 square feet was as follows: nitrogen - 6.2; phosphorus - 0.9; potassium - 3.0; calcium - 0.8; magnesium - 0.4. In contrast, the micronutrient uptake was much lower as would be expected: iron - .058 pound per 1000 square feet; manganese - 0.007; zinc - 0.008; copper - 0.005; and boron - 0.002. These figures are considerably higher than some others have reported, but it is still clear that clipping removal will increase fertilization needs. The amount of specific nutrient removed will vary with growth rate, fertilization program, soil tests and grass.

In another cooperative study with Dr. Beard, clipping removal decreased soil tests significantly. For example, clipping removal from Kentucky bluegrass for 5 years reduced soil potassium tests from 258 pounds available K per acre (no potash needed) where clippings were returned compared to 140 pounds K per acre (2 pounds K<sub>2</sub>O recommended annually per 1000 square feet on general turfs) where clippings were removed. In other studies we have observed deficiencies of both P and K on turfs where these nutrients were not applied and clippings were removed over a period of years. Returning the clippings to the turf permits recycling of the nutrients. Recycling of the nutrients varies in efficiency with greater losses of nitrogen by gaseous and leaching means compared to the other nutrients.

When clippings are removed routinely soil testing is suggested on a more frequent basis. Soil testing on an annual or every other year program is suggested, particularly on intensively managed turfs like fairways. Remember the shallow root system in the summer will tend to remove nutrients from the surface layer of soil with which they have contact. So the nutrients will be removed primarily from the surface soil. Sampling soils to the depth of rooting is suggested, although to get consistent records from year to year it is best to use a consistent depth of sampling, such as 2 or 3 inches of mineral soil. On fairways perhaps 2 inches is best. Mark your soil probe with a hack saw or in some other manner to insure accurate sampling depth.

When clippings are removed, nitrogen fertilization may need to be increased to maintain the desired quality and vigor of turf. But some golf course superintendents have reported a decrease in annual bluegrass and an increase in bentgrass in mixed fairway turfs with continued clipping removal. The nitrogen needs of bentgrass may be lower than for annual bluegrass. Analyze your situation carefully before increasing nitrogen fertilization when you begin clipping removal.

The removal of secondary and micronutrients will also occur with clipping removal. It may be wise to request soil tests for these nutrients

occasionally to determine if they are adequate. Another approach is to periodically use a fertilizer which contains these nutrients. The actual rates of application for micronutrients need to be studied in greater detail. One might consider some experimenting by applying specific nutrients in strips and watch for response. If none occur, you may assume the level of that nutrient is adequate.

#### Literature cited

1. Rieke, P. E., and J. B. Beard. 1974. Nutrient removal in the clippings of Poa pratensis L. 'Common,' Festuca rubra L. 'Pennlawn', and Agrostis palustris Heeds. 'Toronto.' Agron Abstracts, p. 100.