Feeding the Natives©

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INTRODUCTION

The Southern Highlands Reserve <http://www.southernhighlandsreserve.org>, Lake Toxaway, North Carolina, is a 49-ha (120-acre) private, nonprofit native plant reserve located at an elevation of 1,377 m (4,500 ft) in the Southern Appalachian Mountains of North Carolina. The 8-ha (20-acre) "Core Park" is intensively cultivated while the remaining 41 ha (100 acre) are maintained primarily in a natural state. The objective of the Southern Highlands Reserve is to preserve the various plant communities extant on the property plus to preserve and display a collection of native plants and cultivars of these natives to the Southern Appalachian Highlands.

The Southern Highlands Reserve was never farmed or involved in active horticulture. There is evidence of some logging in the early 20th century but no agricultural activity beyond collecting firewood and wildcrafting. The Core Park forest is primarily high elevation red oak forest (Schafle and Weakley, 1990).

SOIL CONDITIONS

The characteristic soils of the Core Park, the only area where cultivars and hybrids of native species are allowed, are infertile mineral soils with a layer of woodland organic duff as mulch and substrate. The organic layer is rarely more than an inch or two deep except in moist coves where erosion and the accumulation of slowly decomposing organic matter has created deep soils with abundant organic matter, which are relatively infertile according to extensive soil test results from the North Carolina Department of Agriculture (NCDA) Agronomic Division. References to these results will be in the terms and index numbers provided in NCDA soil test reports. Information regarding conversion to other units and how these numbers are derived may be obtained at <http://www.ncagr.gov/agronomi/obt14.htm>.

SOIL AMENDMENTS AND FERTILIZATION

In areas of the Core Park where garden beds were developed as well as areas where recommended "wider but no deeper than the rootball" planting holes could be dug without extensive damage to existing vegetation, NCDA fertilizer suggestions were used. Where appropriate for plants such as *Kalmia latifolia*, various evergreen and deciduous native rhododendrons recommended nutrients were applied. Pine-bark soil amendments were spread to a depth of 8 to 10 cm (3 to 4 in.), and then soils were tilled again at the slowest speed allowed by equipment to thoroughly mix soil amendments and fertilizers with the soil based on research reported by Bilderback (Bilderback et al., 1996). Soils were allowed to settle then planting was commenced.

North Carolina Department of Agriculture recommendations arrive from the lab in suggested nutrient amounts per 1000 sq. ft. and/or as pounds per acre. The phosphorus index (P-I) was often minimal or 0. These mountainous soils "fix" phosphorus, thereby limiting P availability to plants. Treble superphosphate, 0-44-0, was often the source for phosphorus. The source of calcium as well as magnesium

was dolomitic limestone applied at the equivalent of tons per acre. However, because of the high soil acidity (Ac in NCDA soil test reports) the soil pH was rarely above 5.0 despite application rates of 2 to 3 tons per acre. Adequate levels of other nutrients existed in the Southern Highlands Reserve soils initially and have been maintained by periodic application of balanced fertilizers as well as the application of composted leaf mulch in the Core Park.

In areas of existing plant communities that appeared to be suffering from excessively low nutrients, perhaps due to high rainfall with acidity in the rainfall leaching already limited nutrients, a very gradual approach was taken to raising nutrients to low to moderate levels of availability, while continually monitoring flora for any negative results. The source of fertilizer used to accomplish this gradual increase in phosphorus was diammonium phosphate, 18-46-0, broadcast to add no more than 0.5 lb of nitrogen per 1000 ft^2 per application. Ground dolomitic limestone was used to provide calcium and magnesium as well as to raise soil pH and increase buffering capacity. Dolomite was broadcast most often at 25 lbs per 1000 ft^2 but occasionally at 50 lbs per 1000 ft^2 per application. These nutrients were applied to noncultivated areas during the winter months.

Soil tests were taken annually with no further fertilization occurring until test results could assess progress, if any. Limestone was applied yearly, while other fertilizer was applied 1–2 times per year.

RESULTS

In cultivated areas of the Core Park, results were as expected based on previous research and results from working with soil analysis done by NCDA Agronomic Division. Plants grew and thrived as if they were in field nursery beds using North Carolina Cooperative Extension recommendations.

The biggest challenge was making improvements to the woodlands without damaging the natural flora of native plants. The initial P-I of 0 has increased to 8–10. Likewise, initial Ca of 10%–20% is now 35%–45%, and initial Mg of 8%–9% is now 12%–15%. *Rhododendron arborescens, R. calendulaceum, R. vaseyi*, and *R. viscosum* are now flowering every year, with major floral displays every few years rather than once per decade. Natural gardens are thriving with no noticed loss of diversity in the existing herbaceous and woody understory. The thousands of trillium, clintonia, galax, and diverse non-rhododendron ericaceous woody species look much healthier and more vigorous than they did when this process started in 2004.

LITERARTURE CITED

Bilderback, T.E., R.E. Bir, and **S.L. Warren.** 1996. Best management practices for field production of nursery stock. North Carolina Coop. Ext. Ser. AG-511. pp. 1–15.

Schafale, M.P., and **A.S. Weakley.** 1990. Classification of the natural communities of North Carolina, Third Approximation. North Carolina Natural Heritage Program, Raleigh, North Carolina.