GREEN GRASS AND GRASS ROOTS

C. W. Lobenstein
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The growing of healthy green grass is the common goal of our respective jobs which brings us together at meeting such as this. The users of our products expect the production of an adequately thick ground cover at all times in spite of the many hurdles of disease, weather, and soils problems and at the same time desire the product to be green. Many times **green** is **not green enough** and we may find ourselves yielding to pressures to make it greener. This is fine—we all desire to produce a product that gains maximum customer satisfaction.

All who have examined critically the question of "How green is good" recognize it is not a new problem. In any series of turfgrass literature this matter is discussed repeatedly. As recently as 1960 in these Proceedings, Dr. Eliot C. Roberts discussed the relationship between foliage and root production and again pointed out that yield, as foliage production, and dark green color were, in themselves, poor indicators of quality turfgrass.

Anyone seriously concerned with turfgrass management recognizes as obvious, the fact that grass, like most other plants, cannot be grown without an adequate root system. Examples of problems observed during the past season illustrate the point that many apparently do not yet recognize this point or overlook it in the pressures of the growing season. Thus some of the factors affecting foliage and root development are perhaps worthy of review and reemphasis.

Mowing is necessary in production of good usable turf but may be a necessary evil as far as the grass is concerned. The fact that clipping practices, especially at the heights often required, reduces foliage and root growth is a cardinal principle in turfgrass growth. Maintenance of high nitrogen levels and optimum moisture conditions stimulate shoot growth much more repidly than root growth especially when new leaves are removed as rapidly as they are produced. This is the second principle. If root development is further placed at a disadvantage by poor aeration through compacted or poorly drained rootzone structure, the effects of the two previous facts are aggravatetd. The poor growth of roots is transferred to poorer shoot growth. Additional nitrogen or additional water in an effort to get quick results only make matters worse. With a good structured,

well aerated rootzone, roubles may still arise from problems of pH or failure of the turf user to appreciate the liimtations of air and soil temperatures beyond which the turfgrass cannot be forced without serious injury.

Development of slow release nitrogen fertilizer compounds in recent years have been a most useful and welcome addition to the tool kit of turfgrass management. The ability to provide a more continuous feeding in place of the very stimulative soluble materials should lead to better turf health. At the same time, many still use moderate amounts of the quick solubles or even spray-on applications to get that "quick-kick" to keep the color up and the user happy. Without full knowledge and awareness of the interacting factors regulating foliage and root growth, all three forms can still cause serious trouble.

As an example, up to June, the greens on a small course in Southern Illinois started the season in excellent shape. Upon subsequent development of poor color, a urea-formaldehyde application was made, the only fertilizer application since early spring. The greens responded—colorwise! During the summer nearly all greens went out from 20 to 90 percent in spite of verticutting, skiping, daily watering, and more U-F. When the damage had been done it was discovered that the greens had received 16 pounds of calcium arsenate per 1,000 in a split application the preceding fall and spring, some potash but no phosphate of record. No soil test had been made but a fairly good guess could be made as to the trouble, especially in view of the arsenical used on typically low phosphate soils of Southern Illinois.

The point of concern here is that even with the exclusive use of slow release nitrogen materials, trouble can surely arise if all factors are not considered. With the typical reduction of the working depth of the grass roots accompanying high temperatures, coupled with depletion or complexing of the phosphate reserves in the surface zones of soil, addition of even slow release nitrogen to get growth and color can backfire just as surely as the more quick soluble forms.

Two home lawns in Carbondale illustrate a similar violation of the cardinal principles of growing a durable turf. They were established with the best of seed with adequate surface ferilization including limestone but no incorporation sufficiently deep into the rootzone of the slowly soluble limestone or phosphates. The results—? By following recommended applications of a complete fertilizer with a high ratio of slow release nitrogen including regular monthly applications, beautiful lawns were produced—as long

as the rains came and before that section of the city ran out of water. Then, with the dry summer and an anti-watering ordinance, disaster struck. Other lawns in the neighborhood, with moderate to little fertilization and particularly lower nitrogen levels, survived. Not as green of course, but they survived. The luxuriant foliage had been produced at the expense of a root system adequate to carry through; moreover, the thatch developed by this program had encouraged the roots to develop even shallower in the tight soil. Small wonder the turf expired when the thatch dried out.

In a long-term fertility experiment on bluegrass at Dixon Springs in cooperation with the University of Illinois, Department of Horticulture, we again observed the breakdown of greenness of color as a measure of turf quality. This experiment was set up on low phosphate soils of very desirable structure but received supplemental irrigation only once during the summer. In the various combinations used, plots receiving high nitrogen rates in monthly increments always rated highest from the viewpoint of color regardless of whether P and K were high or at the minimum level. When drought stress took its toll the high nitrogen plots lost the most grass and by the end of the season were the lowest in measured shoot density.

In review, the basic principles of maintaining good foliage and root balance are summarized by many papers and talks in previous turfgrass meetings as follows: maintain clipping heights as high as possible with the dictates of the grass and its use, diseased leaves cannot support adequate root growth nor use of the turf, phosphorus and slowly soluble nutrients must be adequate throughout the rootzones, other essential nutrients should be supplied in proper balance and quantities, pH and water factors should be regulated with common sense, roots cannot grow without air, and nitrogen levels should be as low as possible without causing the grass to completely lose its vigor to recover when climatic and disease factors become more favorable. Even though the slow release materials may provide a much more desirable means of supplying nitrogen to grow **green** grass, they do not provide a means of escaping the pitfalls of grass being permitted to grow **too green** for its own good.