ECOLOGICAL APPROACH TO TURFGRASS MANAGEMENT

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Turfgrass is a multi-billion dollar a year industry that contributes to our economic growth and on our personal enjoyment. Large areas of turf such as golf courses, parks and homelawns have traditionally been looked upon as "green belts" through desolate urban landscapes. Recently however, the turf industry, along with agriculture in general, has been perceived as requiring too much energy (fertilizer, pesticides). This change in attitude is due in a large part to the demographic changes in the United States population which include:

- First time suburban voting population is greater than rural or inner-city. The people the turfgrass industry has its greatest contact with, are now the largest voting block in this country.
- The vast majority of the population is at least two generations removed from the farm. Thus a lack of understanding in the growing of food or raising of animals. Or as P.J. O'Rourke said in his book "This country is so urbanized we think low-fat milk comes from cows on nutri/system weight loss programs".
- Science does not solve problems, it contributes to our problems. During the 1950's and 1960's, science was looked upon as a savior (vaccines for small pox, polio, the moon missions, etc). Recent failures such as the Hubble telescope, Challenger and the slow progress in finding cures for AIDS, cancer, etc. have lowered the perception of science as being "good" for us. It is important to note that the denial of the scientific method is to surrender oneself from the human race.

In high maintenance turf situations such as golf courses, turf managers not only face the pressure from the general public but also the expectation of the golfers. Over the last decade, pressure to maintain golf courses on a razor-edge, has required astronomical budget increases, and in many instances inappropriate agronomic practices resulting in turf failure.

Numerous turfgrass managers have implemented Integrated Pest Management (IPM) as a means of providing quality turf and minimizing pesticide use through appropriate biological, cultural, and genetic practices. However, I think implementing IPM with the idea of limiting pesticides, is too narrow a vision.

A more global view of turfgrass management should revolve around the concept of minimal disturbance. As turfgrass managers this implies that minimizing practices that overly disturb the turf should be minimized. For example, cultural practices that promote disturbance would be mowing greens at or below an 1/8 of an inch. What turfgrass manager cannot state that this type of practices requires more energy inputs and causes both stress to the plant and the manager?

To implement the concept of minimal disturbance does not mean to stop managing turf (ie. never mow, irrigate, spray or fertilize). What it does mean is understanding what effect our practices have on

the turf and minimize the impact of those practices that cause damage or disturbances. To do this, the understanding of certain ecological principles will help explain how turfgrasses respond to "our" disturbances.

A few of the ecological principles that apply to turf include self-thinning, logistic equation, competition, and Tilman's model of competition. The ecological principle that is discussed here is the application of the concept of self-thinning to turfgrass management (Lush, 1990). The gist of this concept is at full canopy, an inverse relationship exists between plant biomass and density. For example, at high plant densities a large number of individuals (tillers) are present, but each one is not well developed. On-the-other-hand a turf made up of large well developed individuals has a lower density. A turfgrass manager through his management practices influences to some degree this relationship between density and biomass.

A classical example is mowing height. As the mowing height is reduced and full canopy maintained, density increases at the expense of plant development. At the lower height, high density plants are more susceptible to pests, environmental stresses, and wear. By raising the height, stresses become less severe because we are dealing with more developed (mature) plants. This principle can be applied to irrigation. The addition of water to a thin turf results in both increased biomass and density. As incremental water applications are made a level is eventually reached that results in a shift in the plant community toward more density at the expense of plant development. The result from over-watering is a turf that is susceptible to wear. Not much different from an athletic field that has received too much water.

Intuitively a number of turfgrass managers know how a turfgrass system responds to management practices, quantifying these practices is needed. An understanding of applicable ecological practices will help determine the impact of management practices on turfgrass systems.

REFERENCES

Lush, W.M. 1990. Agronomy Journal 82:505-511.