TURFGRASS TRENDS FOR THE 21ST CENTURY

by

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Crystal ball gazing is a high risk occupation. Prognosticators face the probability of being incorrect to varying degrees, especially when the projections are in writing. However, the goal of this author in making these futuristic projections is to stimulate turfgrass specialists and practitioners to think about the future. How will you as a turfgrass professional respond to the rapidly expanding scientific and technological developments? As a leader responsible for a major turfgrass facility, how will you prepare for future increased turf use, turf quality and environmental protection demands? Ten key trends projected for the 21st century are presented to stimulate thought and planning:

1. **Major increase in computer utilization,** with a diversity of office, equipment, and turf applications.

2. **Reduced pesticide usage,** due to more timely, target-specific treatments.

3. **Increased use of pest management approaches,** as our science based knowledged expands.

4. **Continued emphasis on water conservation,** with improved irrigation practices being of highest priority.

5. **More controlled-release fertilizer usage,** for both nitrogen and potassium.

6. **Improved stress tolerant turfgrass cultivars,** in terms of drought, heat, cold, shade, and traffic.

7. **Innovative root zone stabilization,** that will double the use capacity of intensely trafficked sport turfs.

8. **Efficiency in energy utilization,** via equipment/irrigation design and usage.

9. **Employee safety,** encompassing education and protective gear.

10. **Education in continuing technical advances** at all employee levels.

Computers. The application of computer technology in a diverse array of golf course operations will accelerate even more through the year 2000. It will continue to encompass (a) labor records, (b) inventory of equipment, parts, chemicals, fertilizers, etc. (c) budget preparation, (d) purchasing control, (e) cost-center accountability, and (f) scheduling preventive maintenance and monitoring repair of individual equipment units. The computer may be utilized in combination with a modem to network with the Turfgrass Information File at the Michigan State University Library. This is a computer based automated retrieval system encompassing the published turfgrass research and technical papers. Computers and lasers also are being integrated into such diverse areas as monitoring and control of mowing height, sprayer application rate, sod harvesting, and surface land leveling.

Computer systems will be particularly effective in monitoring microenvironmental parameters directly on turfgrass areas. This includes recording data from the field via a microenvironmental sensing station and computing daily mean, maximum, and minimum values for a diverse range of environmental components such as soil and air temperatures, net radiation, relative humidity, and wind speed. These data are then used in conjunction with prediction

models to provide guides in (a) irrigation timing and amount required, (b) probabilities of specific insect or disease attacks in relation to pest control timing, (c) weed seed germination, and (d) a diverse array of turfgrass cultural decisions including timing of turfgrass planting, winter overseeding timing, spring root decline occurrence of warm-season turfgrasses, summer root loss of cool-season turfgrasses, etc.

Pests. Trends in pesticide usage will include (a) emphasis on use of short-residual materials that are readily biodegradable, (b) preference for corrective rather than preventive pest control that dictates timely field diagnostic assessments, (c) treatments made on a target pest specific basis rather than on a broad spectrum, and (d) advances in sprayer technology and pesticide chemistry leading to much lower application rates. When these trends are combined with research data showing no significant pollution of ground water monitoring wells around the US, plus the superior ability of the turfgrass-soil ecosystem to enhance the degradation of organic chemicals and pesticides, this translates to greater protection of ground water quality.

At the same time, pest management approaches will receive greater emphasis. However, it should be acknowledged that more than 60% of the potential turfgrass pests are even now being controlled through appropriate turfgrass cultural practices. One advance is the use of disease and insect resistant turfgrass cultivars, including endophytes to provide resistance to foliar feeding insects. The development of helminthosporium complex resistance in Kentucky bluegrass (*Poa pratensis*) was a major advance. Also, the timing of key cultural practices, such as fertilization, is being recognized as particularly critical in limiting the development of certain turfgrass pests. This requires a more detailed knowledge of the life cycles of pests in relation to specific environmental controls affecting the life cycle.

Water. Major emphasis on water conservation must continue. One priority is the development of new turfgrass cultivars with enhanced drought resistance for non-irrigated areas and also new cultivars with lower evapotranspiration (ET) rates for irrigated turfs. At the same time, more efficient designs need to be developed for irrigation system components. Computer models for predicting ET needs based on monitoring soil-atmospheric factors via a modified Penman Model allow more accurate prediction of irrigation timing and amount required. There also should be an increase in water harvesting techniques especially during initial construction, as well as increased use of reclaimed effluent water. However, the highest priority is the need for those individuals responsible for irrigating turfgrass areas to make better decisions in irrigation scheduling, amount of water applied, and uniformity of water application.

Fertilization. A major problem in fertilizer usage is the continuing emphasis consumer's place on the misguided assumption that the darkest green lawn is the most desirable. In fact, the darkest green grass produced by high nitrogen (N) levels is not the most healthy. Lawn care specialists need to recognize this fact, as professional turf managers have, in order to produce an acceptable medium-green turf with maximum tolerance to pests and stresses. In addition, there will be continuing emphasis on higher potassium (K) levels and the use of iron (Fe) on a more regular basis. Particular attention needs to be given to slow-release nutrient carriers for nitrogen and potassium, with environmentally sensitive areas of greatest concern. Industry must continue to develop improved slow-release carriers in the up coming years.

Turfgrass Cultivars. Over the years turfgrass breeding has emphasized improved turfgrass characteristics including density, low growth habit, and finer leaf texture. Subsequently, emphasis was placed on developing disease resistant cultivars. Now increased emphasis needs to be placed on such environmental stress problems as drought resistance, low water use, heat tolerance, cold tolerance, wear tolerance and shade adaptation. By providing these characteristics, turfs can be sustained at a more healthy level, which results in less proneness to insect and disease attacks and lower pesticide usage. This is because the pests that attack turfgrasses are relatively weak and thus tend to cause the most damage when the turf has been weakened by another factor such as environmental stress.

Root Zone Stabilization. Sports fields encompassing team sports, golf, and horse racing face ever increasing intensities of use. To avoid the compaction problem, high-sand root zones are being employed more commonly. The use of interlocking matrix stabilization techniques will play a substantial role in reducing turf damage and enhancing the root zone environment to provide acceptable turf quality under these conditions.

Employees. Employee safety and training programs need to be focused on (a) new employee orientation and monitoring, (b) continuing in-service training, (c) proper use of safety apparel, (d) use of appropriate safety devices on equipment, (e) following right-to-know guidelines, (f) training key employees in emergency first aid and CPR, and (g) development of an "operations manual" to be provided to each employee for regular reference.

Energy. Efficiency in energy utilization will be an on-going concern. Even though energy is not receiving the attention of a few years ago, it remains an issue that we must address. Efficiencies are a key through (a) improved equipment design and fuel efficiency, (b) cultivars with a slower leaf extension rate that require less frequent mowing, (c) cultivars with a lower nitrogen requirement to minimize the vertical shoot growth rate that dictates more frequent mowing, and (d) lower pressure irrigation systems that reduce energy pumping costs.

Summary. There will be an ever increasing demand for turfgrass managers with sound technical expertise based on both a formal education and real-world field experience. These turf managers will face an increasing demand to perform management skills such as system organization, personnel management, record keeping, accounting, cost control, purchasing, and budgeting. The key to our future is sound knowledge-based applications to turf field operations and office management with emphasis on energy, water, pesticide, fertilizer, root zone, equipment, and labor efficiencies. This will in turn maximize cost efficiencies while producing high quality, functional turfs that are being subjected to ever increasing intensities of use.

UPCOMING JB VISITATIONS:

Provided for Institute Affiliates who might wish to request a visitation when I'm nearby.

- March 22 to 26 - Saint John, New Brunswick, Canada.
- April 26 to May 4 - Singapore and Hong Kong.
- May 16 to 17 - New York, N.Y.
- May 20 to 29 - Southern Europe, Italy, Germany and France.
- June 14 to 22 - Western Oregon, USA.
- June 28 to 30 - Kansas City, Missouri, USA.
- July 17 to 25 - Palm Beach, Florida, USA.