FUTURE SUPERINTENDENT

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THE TURFGRASS manager is facing a technical revolution. As a professional he realizes that turfgrass culture is becoming less an art, and more and more a science. Today, turfgrass publications are scientific; students major in turfgrass science. The future will, perhaps very shortly, see our generally agrarian occupations change into ones of a hardcore, complex scientific nature.

Many changes seem to be eminent in the turfgrass professional's future. One can foresee computer systems that will assist or control management programs. It is conceivable that a central system, located at a major university, will provide satellite systems with directions for maintenance and establishment, the correct time to mow, when and what pesticides to apply, etc.

The difficulties that the professional faces in striving to produce a perfect turf cannot be overemphasized. Aspects of an ideal turf, such as; pure and pest-free stands, a uniform appearing turf, and continuous optimum growth are not natural. Achieving such ideals demands that the turf professional have an in-depth understanding of the cultural system and how to manipulate it.

In the past, both people and turf, primarily because of an agrarian society, were located on good land. And, many old turf areas are still excellent and easy to maintain because the soils were not inverted nor denuded during construction.

Recently much attention has been devoted to devising ways to improve the physical quality of soils for turf. Most of the research with artificial media has led to rather consistent recommendations: use a high percentage of quality sand. U.S.G.A. and Purr-Wick greens, and PAT fields are primarily sand medias. The advantages of a porous media with rapid drainage and good aeration are quite evident, and may leave few alternatives on the media to use in constructing heavy use athletic turf areas. Such artificial systems are not expected to solve all turf problems. Such systems can dramatically increase the turf professional's control of the environment; however, to take full advantage of the system he must understand it and manipulate it to full advantage.

In the future more attention will be given to the preservation of existing good soils. Stringent laws will be passed to preserve and protect our valuable soils, and buildings and turf will continue to be relegated to lower and lower quality land. These trends will necessitate more in-depth research on turf soils, and the use of the more sterile soils will call for increased knowledge and more manipulation by the turf professional. As in the past, a dependence will need to be placed on a rather inexhaustible organic matter supply to improve soil quality.

In the future significant improvements will be made in conventional methods of topdressing and cultivating the soil below the turf surface. And, complex chemical and physical developments will make it possible to turn poor soils into those quite desirable for turfgrass production.

Early turfs were primarily a mixture of several perennial grasses and forbs. Mixtures of cool season grasses continued as a mainstay of the industry until recently. Recent trends have been toward the use of only one kind of grass for turfing areas. Today, warm season grasses are established primarily as single varieties. Whereas, blends of two or more varieties of the cool season grasses, especially of Kentucky bluegrass, are in vogue.

The current deluge of turf varieties seems to have caused undue concern in the turf industry. After all, turf is the most widely grown crop in the country with Kentucky bluegrass, bentgrass and bermudagrass all grown under an extremely wide range of conditions. Many other important agronomic crops have a multitude of varieties, and these have been successfully handled for years. Today, as in the past, there is little effort to regionalize the use of varieties according to their best adaptability, or to adapt turf varieties to adverse environmental situations. True, the wide choice of varieties requires that the turfgrass professional keep abreast of variety development, performance and availability.

Early literature suggested turfgrasses such as redtop, crested dogstail and Wood meadowgrass, none of which are hardly considered for use today. And, in those days grasses such as tall fescue and bahiagrass were not suggested nor available for turf use. Future work on the development of outstanding turfgrasses will continue at a rapid pace, and today's varieties, which would have been considered near perfect a generation ago, will be phased out.

In the immediate future major input will continue toward the development of turfgrasses that have outstanding qualities such as high densities, high levels of disease resistance, and a low growth habit. Drought and salt tolerance, resistance to wear and pollution, and the ability of grasses to remain green under cold conditions will become more important considerations. In addition to the development and introduction of grasses for the South, the arid West and the extreme North, one might foresee the use of bentgrasses with extensive rhizome systems, and turfgrasses with a wide range of color.

Present and future turf quality is often dictated by practices implemented at the time of establishment. The importance of an ability to properly water turfgrass during establishment cannot be overstressed. In cool, humid regions the preferred time to seed has long been late summer or early fall; however, in the past an inability to properly irrigate and natural spring precipitation often caused seeding to be done in the spring. In the not-too-

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distant past factors that often contributed to establishment difficulties were poor seed and seeding equipment, non-use of starter fertilizers, and lack of pesticides to use at the time of establishment.

Presently, there seems to be little research and industrial development directed toward the improvement of establishment techniques. Today, starter and post-establishment fertilization and pest control, seed and vegetative material quality and handling are continuously stressed. But, too often these and other important establishment factors are afterthoughts, and they are not plugged into turf management systems.

Significant and rapid developments in turf propagation procedures seem less likely than for improvements in maintenance. Answers to basic and current questions, such as what are the best seeding (or sprigging) rates for various conditions for the most rapid development of a mature sod or useable turf, need to be more precisely worked out. Once the best depth and placement for various plantings are known, equipment will need to be developed to do the job. Development and selection of varieties that germinate and establish rapidly should become added performance criteria for new turfgrasses. Pre-plant treatment of seed to speed germination and enhance seedling vigor should become common practice. Also, even more sod will be used and development of more efficient sod laying and handling techniques are eminent.

As the demands for better quality turf have evolved, more and more effort has gone into maintenance. These demands have caused the development of sophisticated turf maintenance equipment, and practices such as vertical mowing, aerification, etc. All of which are included in virtually every maintenance program. Recent work by Dr. John Madison and others in California has combined several turfgrass maintenance practices. The procedure is essentially one of making frequent, light topdressing applications of sand (less than 1.0 mm), with seed, fertilizer (and when appropriate, an insecticide and/or fungicide) to golf greens. And as we move ahead, this technique and others like it may become deeply instilled into turf maintenance programs.

In recent years tremendous strides have been made in developing turf irrigation equipment. In part, these advancements have resulted from the demands for the ultimate in turf. Also, the turfgrass economy has generally been quite good, and unlike many other segments of agriculture, results were of primary consideration and costs were secondary.

Today, there seems to be an adequate choice of sprinkler equipment. And sub-irrigation (or at least partial sub-irrigation) is being utilized only to a limited extent. However, there are currently several problems that must be faced. Principal among these seems to be a general shortage of water. Also, the use of poor quality ground and surface water, and effluent water presents

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problems that need to be handled with care (constant monitoring of soil and water, etc.). In the future, in arid and semi-arid regions of the U.S., because of the influx of people and water required to develop natural resources, water used for turf will need to be justified, and little will be used on roadsides, golf course roughs, etc.

An increased use of drip irrigation for turf and the development and use of drought tolerant grasses are in the offing. Every turf manager, regardless of his location, will become more aware of the problems associated with water.

Since man first began using sheep to keep a short turf, there have been many methods employed to mow grass. Reel mowers and their continued refinement, and the relatively recent development and heavy use of rotary mowers have revolutionized the industry.

Current mowing practices have been a result of the kind of equipment available, the demands of the people, and the kind of grass grown. Several turfgrasses used in the past and at present are poorly adapted to current mowing practices. The ability of the new turfgrasses to tolerate current mowing practices has been an important consideration in determining whether or not they will be introduced. Many of the recently introduced turfgrasses may make it possible to change a mowing program. Some of these grasses, depending on your needs, may produce a satisfactory turf with less frequent or even only an occasional mowing.

Mowing equipment will continue to be refined. Larger and larger air cushioned mowers, devices that cut via wave emission, and the availability of more and more sophisticated growth retardants could greatly affect equipment and mowing procedures of the future.

Early turf fertility programs often relied upon the use of compost, manure and leachate from manure to supply nitrogen to the turf. And, the use of sewage sludge has been successfully employed for years. While more recently the ready availability of inexpensive manufactured inorganic and urea fertilizers greatly changed turfgrass management practices. For several years there seems to have been too little attention paid to developing comprehensive fertilization programs, and poor fertilization procedures (too much, imbalances, etc.) may have been more of a problem than was realized at the time.

The synthetic organic fertilizers, such as IBDU and urea-forms have offered effective means of providing slowly available nitrogen for plant growth. Another recent means of controlling nutrient availability has centered around coating fertilizer prills. The coating will allow nutrients to slowly ooze into the root zone where they are available for plant use.

Some recent fertilizer program changes have been influenced by the availability of more efficient applicators. Recently more effort has been given to controlling nutrient availability of soluble materials by making frequent fertilizer applications at light rates. Thus, a more constant growth rate, and the benefits derived from this, have been achieved.

There is a serious need for research that will lead to a better understanding of the nutritional needs of various turfgrasses and to the development of more refined fertility programs. In the past fertilizers were applied primarily to green and thicken the turf. However, recent research and observations are pointing more and more to some rather subtle turf responses effected by fertilizer practices. The effects of various nutrients on factors such as winter hardiness, disease susceptibility and mowing quality, etc. will become more important in developing future fertility programs.

In the future high priority will be given to the selection of grasses that will do well at low soil fertility levels. Development of varieties for specific regions could make it possible to greatly reduce or eliminate the need to apply specific nutrients. For example, the need for application of iron-containing fertilizers on turfgrass grown on the alkaline soils of the West might be greatly reduced or eliminated.

The future for the development and utilization of fertilizers designed specifically for turf use is bright. In the near future, if turf is tending to grow too rapidly, it may be possible to "turn it off" by applying a chemi-

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cal to regulate nutrient availability in the soil. Fritted fertilizers that will release nutrients, especially micronutrients, over a period of 10 to 20 years or more may become widely used for turf. And, because of the evolution of more sophisticated irrigation equipment and higher quality fertilizers aqueous fertilization will become commonplace.

In the future legumes such as improved white and strawberry clover, because of their nitrogen fixing abilities, may again become widely used for turf. More and more attention will be given to the use of organic wastes as nutrient sources. And, fertilizer use will be well planned, with major consideration given to long term effects, and not just to tomorrow.

Highly selective chemicals are now available for the control of virtually any turf pest problem. Only a few years ago there was no satisfactory selective chemical control for annual grasses in new seedings of Kentucky bluegrass, nor Pythium blight in bentgrass. Today, however, because of available pesticides, grasses are grown well beyond their accepted range of a few years ago.

The effects that certain pesticides may have on the turfgrass system have been and are currently under investigation. Research findings to date indicate that certain pesticides may materially reduce root systems, increase thatch, etc. Also, research and observations have indicated a wide variability in varietal tolerance to specific herbicides and to fungicide-resistant strains of fungi. Thus, future pesticides will be subjected to even more rigorous testing. And, the turf manager will be concerned with much more than immediate pesticide effects.

There will always be a need for better pesticides. However, the current availability of outstanding products will likely restrict efforts for and the introduction of new pesticides. For several years activated charcoal has been used to inactivate specific pesticides. Future significant developments in inactivation of pesticides would open a new era for pesticide use in turf management. Pesticides of the future are likely to become much more specific, and the turf manager will have to become more knowledgeable about pests and pesticides.

In the future pest problems will be greatly restricted through the introduction and use of improved varieties. The future turfgrasses will have combined resistance to most common insect and disease pests.

Turfgrass management practices are continually changing, and many factors will influence turfgrass management decisions. Successful management programs are developed through an in-depth understanding of the turfgrass system and its many complexities. The future of the turfgrass industry depends upon the professional's ability to supply and utilize technical information. The turfgrass manager's job is not going to get any easier. □