SUMMARY OF ACCOMPLISHMENTS IN TURFGRASS RESEARCH

Research continues to contribute to the turfgrass grower's knowledge. The contributions that are made enable him to manage his turfgrass areas in such a way that he can provide better quality turf more easily, efficiently and economically.

There are many facets of turfgrass research. This summary has been confined to the definite contributions in the field of turfgrass management which are considered to be applicable by the average growers. There are many cases where information from the fundamental sciences may be related to turfgrass management. The borrowed knowledge from these areas is very useful and extremely important. These contributions, however, are extremely hard to define and to relate precisely to the business of turfgrass management. Likewise, contributions which are concerned with techniques related to research efforts but which are of little or no importance to the practical grower of turfgrass, have not been discussed.

GRASSES

Several improved species or strains of grasses have been released for use since 1951. New bentgrasses include Pennlu and Penncross, both developed at the Pennsylvania Agricultural Experiment Station. Pennlu is a vegetative bentgrass for use on putting greens. It has been studied at the Pennsylvania State University for several years and has demonstrated superiority. Penncross is a bentgrass strain synthesized by the crossing of numerous selected parents. It is one of the first improved bentgrasses that can be propagated by seed. Research in the years since 1951 has confirmed the superiority of some of the older vegetative strains. Among those which have been outstanding are Arlington and Congressional.

New Bermudagrass strains include Tifgreen (Tifton 328), Tiffine, which was formerly designated Tifton 127; Gene Tift, which was selected in Florida; and two strains from the Texas Agricultural Experiment Station, which bear the designations T-35A and T-47. T-47 is a rather coarse-bladed grass which forms a very dense, wear-resistant and drought-resistant turf. The other three strains mentioned are fine-leaved types which are suitable for putting green use. Tiffine is a result of a breeding program at the Georgia Coastal Plain Experiment Station. It has come to be used rather widely throughout the southeast.

Two new Zoysias are worthy of note. Meyer zoysia was released in 1951 by the U. S. Department of Agriculture and distributed to state experiment stations. It has been planted on a broad scale and has been publicized quite highly by commercial growers. Emerald zoysia is a named strain developed and released by the U. S. Department of Agriculture. Emerald is a hybrid zoysia produced by Ian Forbes, Jr., and resulting from a cross involving selected parents of *Zoysia japonica* and *Zoysia tenuifolia*. This particular hybrid was selected by Forbes as being outstanding among the progeny of this cross. Emerald zoysia has not yet been extensively planted but it appears to be a superior strain.

Merion bluegrass has been planted extensively, has found considerable favor in some areas, and has encountered difficulties in other areas. Merion bluegrass originally was selected primarily for Helminthosporium leaf spot resistance. Leaf rust and smut are two of the ills that have befallen Merion bluegrass.

Pennlawn Creeping Red Fescue has been released by the Pennsylvania State University. This grass results from the random crossing of three strains which demonstrated superior turf forming qualities. Seed of the synthetic variety, Pennlawn, is producing turf superior to that formed by any of the three parent strains.

Penngift Crown Vetch has also been released by the Pennsylvania State University and described as an excellent cover for road shoulders.

In addition to the release of new strains and observation of strains released earlier, there has been considerable work done in the way of variety testing. Variety testing in some cases is quite important to the turf users within a particular area. An outstanding example of this type of testing is that carried on at Kansas State College in cooperation with the Central Plains Turf Foundation. The following paragraphs are quoted from a report by Dr. William Pickett:

> "In the variety trials the failures are as important, in saving money for the growers of turfgrasses, as are the successful grasses. For example, F-74 creeping red fescue made a beautiful showing from October to June, but was badly damaged by heat and disease in July. Manilagrass has been so slow in becoming established in the trials, and is green only from June to October, that it cannot be considered at all satisfactory for any lawn use in this region, even though it is perfectly hardy. Blue grama has no place in the turfgrass picture since it is a bunch grass. Its presence in native buffalo sod is not detrimental, but its presence has no advantage.
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> "The warm-cool mixture of Manilagrass and Arlington bentgrass was dominated by the bentgrass under irrigation. Without irrigation, crabgrass would have overgrown both grasses. The same is true of Arlington bentgrass and buffalograss, except that the buffalo will survive unirrigated.
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> "Perennial ryegrass was discontinued from the trials because it was felt that its behavior was confirmed after three seasons. It continues to be recommended as an excellent temporary lawngrass.
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> "Merion bluegrass has not proved greatly superior to Kentucky bluegrass. It does stand close regular mowing somewhat better, but tall mowing is one of the better ways of controlling crabgrass invasion. Merion bluegrass has proved highly susceptible to wheat rust, curvularia, and white grub damage—so much that it must be considered but slightly superior to Kentucky bluegrass and perennial ryegrass under Central Plains conditions.
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> "During the warm season, with no irrigation, Meyer Zoysia and U-3 Bermudagrass have been outstanding grasses. Results indicate these grasses should be mowed less than one inch and should receive between five and ten pounds of elemental nitrogen per thousand square feet during the growing season. Perhaps the Zoysia could hold good color with less.

Mixtures of Zoysia and Merion are being established this season for future trial.

"The tall fescues, such as Kentucky-31, have performed well at the taller mowing heights. Their drought resistance and ability to hold good color are desirable characteristics. The coarse texture and bunchy growth habit are distinct disadvantages for good turf production."

Workers at UCLA and at Rhode Island have grown mixtures of warm-season and cool-season grasses. While the correct balance of these mixtures is controlled by management and local conditions, it is significant that the effort to grow warm-season and cool-season grasses in permanent combinations has met with success in some areas.

MANAGEMENT

Management involves many practices. One of these practices which is extremely important is that of fertilization. Because of diversity in soils, in climatic conditions, and in species involved, fertilizer tests sometimes are of value only to localized areas. Some of the fertilizer investigations that have been carried on, however, are of such a nature that they can be applied over a wide area. Studies concerned with the nitrogen, phosphorus, and potassium requirements of Bermuda have been carried on for a number of years at Texas A. & M. Findings indicate that Bermudagrass turf responds to as much as 12 pounds of elemental nitrogen per 1,000 square feet per year. Nitrogen fertilization at these rates is considered almost beyond the limits of practicality. Therefore, recommendations have been made whereby nitrogen would be used at a lighter rate. Eight pounds of nitrogen per 1,000 square feet per year has been suggested. Tests showed a rather poor response to both phosphorus and potassium. However, when clippings are removed, and when nitrogen is applied at sufficiently heavy rates to promote rapid vegetative growth, phosphorus and potash will be removed from the soil in rather large quantities. For these reasons fertilizer recommendations have followed a 2-1-1 ratio.

One of the significant advances in fertilizer practice has been the development of urea-formaldehyde materials. These are high nitrogen materials which will release the nitrogen to plants rather slowly. In this respect the materials behave in a manner similar to organic nitrogen carriers. Urea-formaldehyde materials have been tested at numerous stations and results have been reported in appropriate publications. Urea-formaldehyde materials are now commercially available and are in use to a limited extent.

Liquid fertilizer materials are finding a more prominent place in turfgrass fertilization. For many years liquid fertilizers were considerably higher in price and turf users were advised to buy them only when the price was comparable to that paid for conventional type fertilizers. The relatively new practice of marketing the liquid products of ammoniated phosphoric acid has made liquid fertilizers plentiful enough that they compare favorably in many cases with the dry, granular type materials. The fact that liquid fertilizer materials can be used at the same time as fungicides and insecticides makes them much more appealing to many turf growers.