THIRTY YEARS TROUBLE SHOOTING TURF PROBLEMS

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"All other Noer material in this issue is about Mr. Noer. The following text is by him. It was a paper given by O. J. on March 29, 1961 at the Wisconsin Turfgrass Conference. That conference was held at the Wisconsin Center on the University of Wisconsin campus in Madison. Thanks to Dr. Jim Love for the suggestion and the material."

Advances in the art and science of turf grass culture have been tremendous during the past three to four decades. Even bigger ones are in the making. They will be built upon the achievements of the past.

Until 1920 turf grass management was confined to sports turf areas, with most emphasis on golf courses. Maintenance was dominated by British talent imported from Scotland and England. They were golfers essentially with a smattering knowledge of grass care. British methods were employed mostly, some good and some bad, due to marked climatic differences between the British Isles and continental America. Over there a favorable, cool, moist, island-type climate simplified turf grass management. Their methods were found wanting in American areas of continental type climate with cold winters and hot summers.

Fescue was the prized early time grass on greens, fairways, and even on tees. It did well until the appearance of modern power operated mowers. Then fescue lost favor because of its inability to survive under frequent close cutting.

Early-day maintenance was simple. Greens and tees were topdressed every three to four weeks. Otherwise bone meal was the only supplemental fertilizer. The topdressing was a mixture of manure compost and sand. Compost piles were built several years before they were needed. They were long piles consisting of manure and soil in alternate layers. The piles were reworked several times each year to kill weed seeds, promote straw decomposition and insure a uniform product.

The composted manure supplied ample potash and some nitrogen. The bone meal furnished plenty of phosphoric acid. Aside from a skimpy amount of nitrogen, grass received everything else it needed.

Golfers never complained about poor greens in a bad season. It was accepted as inevitable. Fungus diseases were less virulent under the simple, low nitrogen feeding program. Turf troubles were due to other causes mostly.

Fairways were cut weekly, if possible, when horses were the motive power. On some courses fairways received an occasional dressing of manure. It was applied in fall and lumps were destroyed and worked into the turf with a spike-tooth harrow, or a drag mat in the spring.

When golf started to change from a game for the rich to one for the average citizen, the number of courses increased. It became necessary to find answers to problems associated with turf grass development and maintenance, due mostly to the demand by golfers for good greens and tees throughout the playing season, and for better fairway turf.

Although a man named Taylor is said to have established the first turf grass plots in this country, the initial, technically sponsored plots were started by Dr. H. J. Wheeler at the Rhode Island Agricultural Experiment Station in Kingston. This was done when he became Station Director after obtaining a Doctor's Degree in Germany. The plots consisted of fertilizer trials on lawn grass type turf. By-product ammonium sulphate and Chilean nitrate of soda were the main chemical sources of nitrogen at the time. They were used alone and in combination. The plots received phosphate and potash, but no lime. The marked reduction in weeds on the ammonium sulphate plots was very striking. Increased soil acidity was thought to be the sole reason for weed elimination. This lead to the "acid era" in turf culture. Ammonium sulphate only was used on golf greens. Warnings by soil scientists that soils could become too acid, even for acid tolerant bent grasses, were ignored. The acid era died along with the turf on greens during the hot, humid, and wet summer of 1928. Then lime and other types of nitrogen fertilizer regained favor.

Despite the disaster of 1928, the Rhode Island plots were continued for sometime longer. Finally winterkill became so bad on the sulphate treated plots that they were discontinued. The same thing has been observed elsewhere. Grass has difficulty surviving adversity — in summer or winter — on areas where ammonium sulphate is the only or main source of nitrogen, especially where lime is not being used.

The Green Section of the United States Golf Association was organized in the early 1920's, following the overnight loss of greens on a Washington, D.C., golf course just before a major national tournament. Dr. Piper and Dr. Oakley were the first leaders. Through their efforts Dr. John Monteith, Jr., a U.S.D.A. plant pathologist, was assigned the task of investigating turf grass diseases. He identified the organisms responsible for dollar-spot, brown patch, and snow mold. They were the troublesome diseases at that time. In the snow mold investigation he was assisted by Arnold Dahl. The calomel-corrosive mixture now sold under various trade names was developed from these trials.

Fungicides are needed in times of stress, but type of grass and management practices have profound effects upon the frequency and severity of disease attacks. These contributing factors need to be explored further by turf grass scientists. When their impact is understood, good management can reduce the amount and severity of attacks and make control easier.

Several years later, when the grub of the Japanese beetle threatened all turf on golf courses in the Philadelphia and surrounding areas, the game of golf was faced with the possibility of extinction. Carbon disulphide was tried, but its damaging effect on grass was as bad, or worse, then the grubs. B. R. Leach, a U.S.D.A. entomologist, was assigned the task of finding a way to stop turf damage by grubs. He wisely sought an insecticide and came up with acid lead arsenate. Arsenious oxide, calcium arsenate, and other related chemicals gave better control, but the hazard of turf damage was greater. So, by assigning the problem to a qualified, well trained entomologist, golf turf was saved. Sometime later industry developed the chloronated hydrocarbons (D.D.T., Chlordane, Aldrin, Dieldrin, Benzene hexachloride, etc.). They have been faster acting, producing 90 percent kill within several weeks. Lead arsenate cannot match this accomplishment, because it takes almost a year for it to move down into the soil and form a barrier layer of poison soil.

In subsequent work by other entomologists, Milky White Disease was discovered and developed along with other predators. These and other natural enemies made the Japanese beetle grub just another pest.

At a Green Section meeting in New York, Leach made a claim of weed control by using lead arsenate. He had noticed less crab grass, chickweed, and Poa annua in the lead arsenate treated plots. In his prophetic statement, he said there would be no more hand weeding on lead arsenate treated greens.

This overstatement aroused interest in selective weed control. Dr. Monteith, Jr., the current Director of the Green Section, became interested and assigned the research project to Fred Grau, who was a Green Section employee and a graduate student at Maryland. He devised a method of selective control with sodium chlorate first, but it proved to be too hazardous to grass, and is a dangerous explosive chemical. Then he perfected the use of arsenic acid and sodium arsenite. At the start they were used to control broad-leaf weeds, clover, crab grass, knotweed, chickweed, etc. When the 2, 4-D type herbicides were discovered, it looked as though arsenicals would be discarded. They have been for broad-leaf weeds, but sodium arsenite and arsenic acid still have a place in the weed control picture.

The next big advance came after Dr. Verne Stoutemyer suggested that there might be substances of the hormone type that would have a retarding effect on growth and selective action might enable them to control weeds without harming desirable plants. Although a man named "Jones" holds the basic patent on 2, 4-D, Stoutemyer provided the original idea. Now there are a host of selective weedkillers.

Pre-emergence weed-killers are the most recent development in herbicides. Research has been directed toward finding a chemical to control crab grass and goose grass. The aim has been to prevent seed germination or kill the plant in the seedling stage. Extravagant claims are being made for some products now on the market. There may be a place for such a material on areas where the turf grass cover is good. It is of doubtful value on areas with little or no grass cover. There is no substitute for a healthy, dense turf. Its formation is the first step in any weed control program.

The search for new herbicides will continue and better ones are bound to come. However, golf course superintendents need more information about rates and times of application in order to avoid the serious damage that has taken place on golf turf areas. Selectivity is a relative term. Injury can be insidious. Then the damaging affect of one or two treatments is hardly ever noticed, but the cumulative effect can be bad. Blue grass withstands injury best, followed by fescue and bent. Damage is more likely on closely clipped fairway grass, and less severe on the higher cut roughs.

After close cutting doomed fescue mixed or South German bent was used on golf greens in the North. World War I stopped importation of seed from enemy countries. Then the Green Section started to develop turf by vegetative planting of creeping bent grass stolons. This program was responsible for the development of named strains, such as Washington, Metropolitan, Arlington, Congressional, Toronto, Cohansey, and many others. This is another example of a Green Section contribution to better turf.

Lyman Carrier was associated with the Green Section while he was a U.S.D.A. employee. On a Western trip he discovered the large area of bent grass in the Coos County area of western Oregon, along the shore of the Pacific Ocean. He saw the possibilities of seed production and was instrumental in starting the program which has produced Seaside and Astoria bent grass seed in quantity. Thus this country became independent of foreign produced seed.

Ant control was a tedious, difficult job until the discovery of Chlordane. Likewise, the cricket mole was hard to control in the South. Now they are no problem. Chlordane eliminates them quickly.

Mowrah Meal and corrosive sublimates were standard materials for the control of earthworm casting on greens. Lead arsenate proved to be much

longer lasting and hence a superior product. Some years ago greens on the Eastern seaboard became infested with the so-called "stink worm." The casts produced in twenty minutes made greens unplayable. None of the other known treatments, including lead arsenate, had any effect on the stink worm. In desperation, Mr. Goodstein of Quaker Ridge and Mr. Langben of Sleepy Hollow, both in the metropolitan New York area, underwrote a $2,000.00 research project. Shread of the Connecticut Station soon found the answer. Here again the right approach saved the day.

For many years the Green Section Turf Garden at Arlington, Virginia, was the only place where serious turf grass studies were underway. Obviously, their interest was in golf turf. Massachusetts, Rhode Island, and Rutgers started next. Then came Pennsylvania, Michigan, Iowa, Purdue, and more recently Georgia, Florida, Texas, Arizona, California, Washington State, Illinois, Ohio, Virginia, Louisiana, and Wisconsin have joined the field.

Musser at Pennsylvania State University has pioneered in the production of superior grasses from seed. He has produced the breeder stock of Kentucky Merion blue grass, and has developed disease resistant Pennlawn fescue and superior Penncross bent for putting greens. These have been notable advances.

Progress in the South has been notable in the past decade. They now have improved strains of Bermuda grass for fairways, greens, and tees — thanks to Dr. Glenn Burton and other workers. Methods for the control of hard-to-kill weeds have been developed. They have found better grasses for winter overseeding than rye grass and have fungicides for disease control.

In Canada turf work is under way at Ontario Station in Guelph, for Manitoba in Winnipeg, for Alberta in Edmonton, and for British Columbia in Vancouver.

Advances in turf grass management on the American Continent during the next decade should eclipse the findings of the past three decades. We can look for even better grasses and a better understanding of the conditions controlling grass growth in every climatic section of the Continent.

Agricultural colleges of necessity cannot specialize in golf turf problems. Some qualified organizations, such as the Superintendents and the Green Section, should evaluate their findings in that light. Turf must meet the test of play.

In times of stress or serious trouble some think a soil test will disclose the answer. When samples are collected properly and a good extractant is used, soil tests can be useful. But every other factor controlling turf grass performance must be favorable in order for lime or fertilizer to give the results expected of them.

In most cases the answer to a turf program can be found on the property. Grass comes first. Is it adapted to local climate and is it being cut at the proper height? Then come clover and weeds.

Herbicide treatment may be needed, but cultural practices have a marked effect on the weed population. As stated before, there is no substitute for a dense, healthy sward of grass. Soil should be considered next, especially its physical make-up. Layering of any kind and surface thatching can be harmful on greens and tees. On other areas soil modification by topdressing is out of the question. Aerification may be needed on heavy soils, and supplementary irrigation on droughty and on sandy soil. Drainage is the next important item, including surface, sub-soil, and air drainage. Surface runoff is the quickest way to remove surplus water during and immediately after downpouring rain. Then good under drainage can handle the excess soil moisture. Air drainage is an important item on greens and tees, especially when located in low-lying pockets, or when surrounded by trees. Water management is very important. Too much or too little are both bad. Daytime syringing of greens is necessary during hot weather whenever root systems have become shallow.

Then there is the necessity of protecting the turf from every kind of injury. It may be the result of traffic of all kinds, insects, rodents, and turf diseases. In cases of disease it may be the primary cause, or it may be secondary to something else. For example, failure to stop iron chlorosis by applying a little ferrous sulphate promptly may pave the way to serious damage by one of the leaf spot diseases because of weakened leaf tissues. In this case leaf spot was secondary and iron chlorosis the real culprit.

When confronted with a turf grass problem, one must be confident, and reasonably sure of success in its solution. Knowledge and experience help produce the answer. One must understand all the factors affecting grass behavior, and know their impact upon turf development and grass growth. Experience is just as important. It enables one to use or to modify procedures which have solved the same or a similar problem elsewhere.