

THE EARLY YEARS

"At first sight, the growing of a piece of fine turf seems to be a simple matter, and this has misled many persons to underestimate woefully the difficulties to be overcome." These remarks were made in 1917 when growing a piece of fine turf may not have been simple, but certainly simpler than today. They are the words of Piper and Oakley, USDA turf scientists in Arlington, Virginia, in their book *Turf for Golf Courses*, now out of print.

In the past 63 years the turf industry, largely propelled by the needs of golf and sod production, has solved many of the conditions once considered Mother Nature's ire. In some cases our solutions have created new problems. Some suggest the amount of new knowledge is too much to expect a turf manager to know, inferring the value of the turf does not warrant the effort.

A few authors have estimated the value of the turf industry to dramatize the need for research and the importance of the science. Nutter and Watson estimated a 1965 value for turf expenditures at nearly \$4.5 billion in the American Society of Agronomy publication *Turfgrass Science*.

Money is not the only reason to pursue answers to questions raised by practicing turf specialties. The main reason should be to provide a complete set of facts on turf biology to develop logical, scientific answers to problems encountered in the field. We still can't claim to have enough information to solve such problems as disease, weeds such as nutsedge and *Poa annua*, and insects such as *Aetenius spretulus* and the Greenbug aphid. We are playing with less than a full deck much of the time.

With needed support, there is little reason why many of these still unsolved problems can't be tackled



Tom Mascaro

Founder of West Point Products, the company that introduced the aerifier, verticutter and three-wheel turf vehicle.

during the 1980's.

Consider what turf management problem solving was like 60 years ago. Actually, what superintendents noticed back then is the backbone of today's knowledge. Piper and Oakley reported in 1917 that alkaline soil encourages weed growth. In 1917, following a severe epidemic of *Rhizoctonia* brown patch on turf (as identified by Piper) an agricultural fungicide developed in the late 1800's called Bordeaux mixture was used on turf. Reel mowers pulled by teams of horses mowed golf courses until the first gasoline tractors were developed and applied to mowing in the early 20's. The reel was a British invention dating back to 1830.

The compost pile was a major source of fertilizer for early golf superintendents, then called greenskeepers. In addition to topsoil, manure and compost, turf managers used bonemeal, cottonseed meal, dried blood, hoof meal, nitrate of soda, sulfate of ammonia, acid phosphate, rock phosphate, and muriate and sulfate of potash.

Herbicides were virtually nonexistent. Sulfate of ammonia was said to help control white clover, arsenite of soda was used for chickweed control, and even sulfuric acid and gasoline were injected or brushed on the crowns of weeds. Arsenicals were used for worm and insect control.

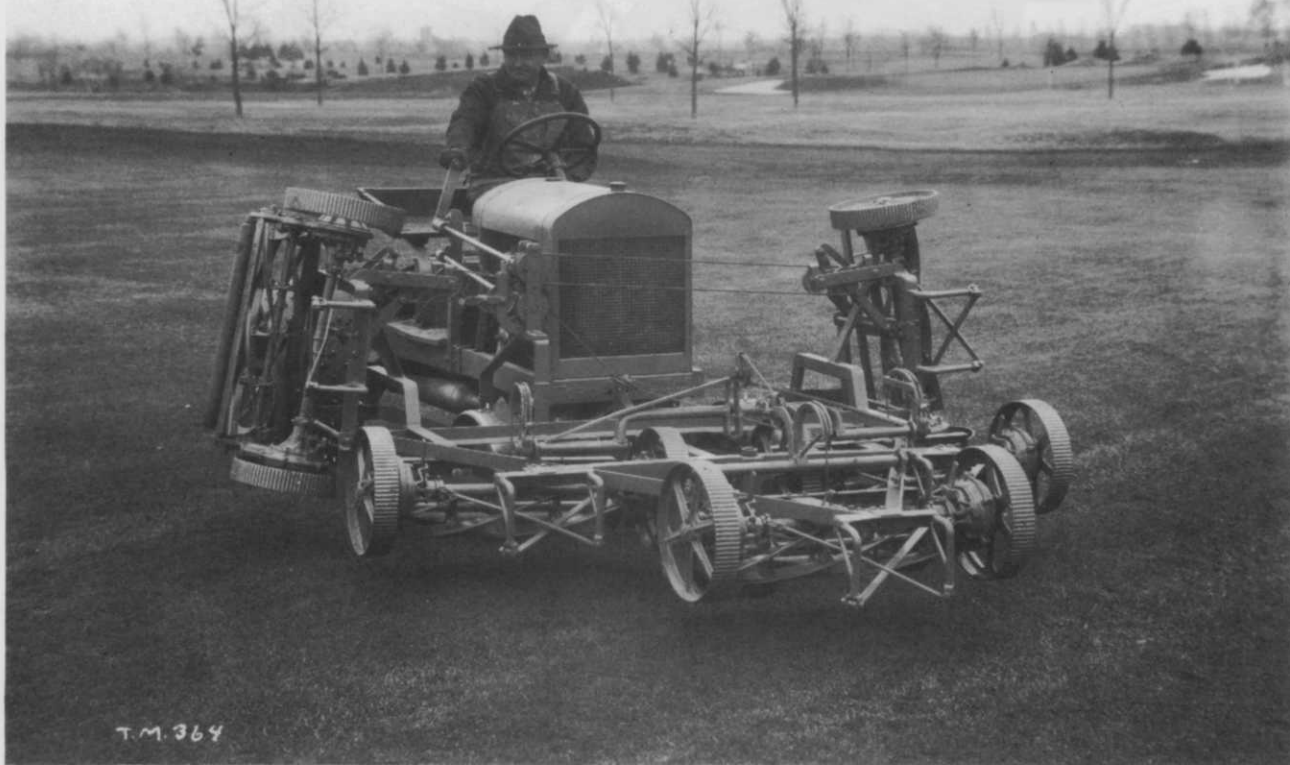
Weed control, grass cutting, and installation were performed totally by hand. Labor was cheap. Scythes, aerifying forks, sod spades, and numerous other hand tools preceded the mechanical versions of today. Many superintendents held their maintenance tricks secret from golfers and other superintendents. This was their method of job security. It was also one of the main targets of early organizers of greenskeeper associations.

Topdressing with sand and organic soil was practiced in the first 20 years of the Twentieth Century. In some cases greens were topdressed weekly and fairways at least annually. Greens were sliced prior to topdressing with crude carts dragged across the green which had many small blades on the bottom to cut the surface.

Large drop-type seeders were available and pulled across golf courses by horses. Horses provided the muscle on many courses into the 30's. They wore special steel or leather boots to prevent damage to the turf. Greenskeepers were very careful to keep heavy horses and later machinery off their greens.

Spot sodding was the solution to weed infestation and disease. One foot squares of bentgrass were cut from areas in good condition, trimmed to the proper thickness, and carefully placed where poor turf had been removed.

Irrigation was either by flooding or surface hosing. Irrigation was by



Toro Junior Tractor and five-unit gang mower on well-groomed golf course in 1936.

no means a new concept, dating back to Egyptian and Greek cultures. But it would be another 30 years before pressurized, quick coupling systems would take over.

The United States Golf Association Green Section was established in 1918 to solve turf problems. During the next ten years, three valuable publications were started to serve golf courses (*USGA Green Section Bulletin*, *Golfdom* magazine, and *The National Greenkeeper*). The *Bulletin* was published by The Green Section from 1921 to 1933 when the Depression forced staff cutback. 1926 was the founding year of the National Association of Greenskeepers of America, predecessor to the Golf Course Superintendents Association of America. NAGA started *The National Greenkeeper* in 1927 for its members. A third publication was launched in 1927 by Herb and Joe Graffis, *Golfdom*. It was the only private business publication and it was designed to serve all needs of the golf course, not just the turf needs.

1927 was also the year of the first educational program for turf

managers at Stockbridge Winter School, part of the University of Massachusetts. This eight-week



Lawrence Dickinson

Taught first school for greenskeepers at the University of Massachusetts in 1927.

course was taught by Professor Lawrence Dickinson during January and February. Greenskeepers from as far west as Illinois and Ohio attended this concentrated course on turf maintenance.

Between 1920 and 1931 the number of golf courses in the U.S. exploded from 500 to more than 5,000. Equipment and chemical companies quickly took note of this growth market and started designing products for it.

Consequently, companies such as Toro, Jacobsen, Worthington Mower Co., National, Roseman, and Buckner started making products for the golf maintenance market. World War I had pushed the gasoline engine into use over steam. Engineers, like National Mower Company's R.S. Kincaid, refined the tractor/mower combination into a practical tool for golf courses. Although greenskeepers had reservations about compaction with heavy mowers, they bought the gasoline tractor mowers as fast as companies could make them.

Mallinckrodt, Du Pont, and Bayer developed improvements to the Bor-

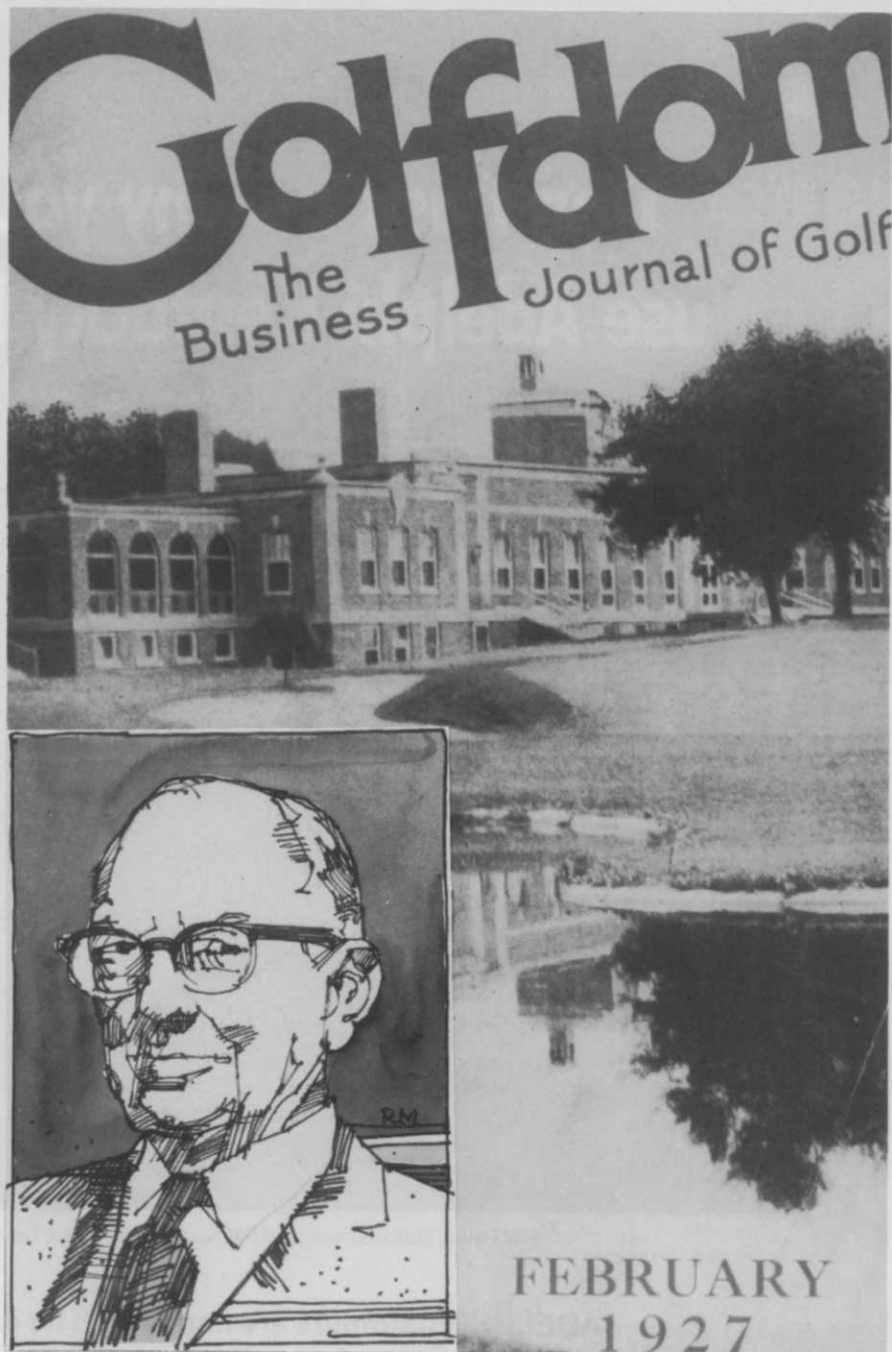
deaux mixture for disease control. Mallinckrodt developed Calo-Clor and Calogreen, mercuric chloride compounds. Bayer produced Uspulum Nu-Green and Du Pont offered Semesan, a chlorophenyl mercury compound. These fungicides were used for many years.

By the late 20's the golf industry was very healthy. Other sports were gaining strength on a college and professional level. The concept of a well-groomed memorial park instead of standard cemetery originated in the 20's. Scotts' publication *Lawn Care* was launched and created more residential interest in turf. Turf was booming. It was another 30 years before turf regained its momentum after the Depression and two wars. During that period, however, progress continued.

John Monteith, director of the Green Section, spearheaded much of the technical progress in the 20's by working in conjunction with the USDA facility at Arlington. The *Green Section Bulletin* kept turf managers current. It was a blow when USGA was forced to lay off everyone in the Green Section except Monteith and stop publication of the *Bulletin* in 1933. Among those let go were Arnold Dahl, who had coauthored *Turf Diseases and Their Control* with Monteith in 1932 and Fred Grau, a graduate of the University of Nebraska turf program. Dahl became a turf consultant and Grau began his Ph.D. work at the University of Maryland.

Progress did not come to a complete halt in the 30's. Du Pont introduced the fungicide, Thiram, in 1931. Research continued on weed control and turfgrass selection at universities. Combinations of fertilizer and lead arsenate were proving effective. Merion Golf Club superintendent Joe Valentine selected the first quantities of Merion Kentucky bluegrass in 1936, the same year Grau joined up with Burt Musser at Penn State after completing his Ph.D. O.J. Noer, a progressive businessman with the Milwaukee Sewerage Commission travelled the U.S. touting Milorganite and Milar-sentie for turf.

The preservation of the science can be attributed to regional personalities, whether they were golf course superintendents, suppliers, university specialists, or association leaders. Without them, the turf market would have lost ground. The hard times may have unified turf



Turf and golf growth in the 1920's was recorded by a number of new publications including *Goldom*, founded by Herb Graffis (inset) and his brother Joe in 1927.

managers, especially golf course superintendents, and caused continued progress through discussion of mutual concerns. This unity kept healthy manufacturers interested in the market and encouraged inventiveness in those that had mechanical talent.

In 1936, Tom Mascaro launched a topdressing supply business in West Point, Pennsylvania. He quickly made acquaintance with superintendents and turf specialists, such as Monteith, Dickinson, Musser,

DeFrance at Rhode Island, and Sprague at Rutgers. It was already understood that some type of cultivation prior to topdressing was beneficial. Removal of thatch by hand raking was also practiced. Ten years after it began, West Point Products, with the technical assistance of Grau, developed the first commercially produced aerifier and verticutter. The first aerifier was tractor drawn and used a series of spoon-shaped rods to pierce the soil surface. His technology was purchased

in 1969 by Hahn Inc. of Evansville, Indiana. Turf technology regained momentum in the late 40's and has yet to stumble like it did in the 30's.

After World War II there was a flurry of activity in the turf market. Fanny Fern Davis, Green Section director during the war, supported the use of a new herbicide, developed in 1941 to be a fungicide or insecticide. It was a substance that selectively affected the growth of plants, specifically broadleaved plants, without harming grasses. 2,4-D was the start of a chemical revolution in weed control. It was the basis for the new commercial applicator market, treating roadsides, drainage ditches, rights-of-way, and lawns.

The 40's was also the first identification of turf as a special committee in the American Society of Agronomy. This was an important event since now turf related research would be reported in the *Agronomy Journal*. The creation of the committee was pushed by then director of the Green Section, Fred Grau, who returned to USGA for eight more years of service.

Progress was also made with fertilizers. It was discovered in the early 20's that combining the hydrogen in natural gas with nitrogen produced ammonia. By reacting ammonia with carbon dioxide gas, a more stable source of nitrogen was created, urea. But urea was volatile and did not persist in the soil as a source of nitrogen for plants for very long. It was discovered that by chemically reacting formaldehyde with the urea a longer lasting product was obtained, ureaformaldehyde. Both Du Pont and Nitroform Agricultural Products introduced UF products in the 40's, Uramite and Nitroform.

This chemical revolution extended to growth retardants. Giberellic acid was the first to receive attention for turf use in the late 40's. Growth retardants required very precise use and exhibited side effects which were unacceptable to major turf markets.

The chemical that really started the revolution was the insecticide DDT. Commercial production of this chemical began during the War and continued until environmentalists, spurred on by Rachael Carson's *Silent Spring*, stopped its production and sale in certain countries. DDT was the first major breakthrough with insecticides since the discovery of the arsenicals, nicotine, and pyrethrum decades before.

Subsurface irrigation began to gain acceptance in the 40's. California companies set equipment standards which spread rapidly to the Southeast and slowly northward. Quick coupling systems of the 40's were installed with galvanized metal, copper, or asbestos pipe. Automatic controls (electromechanical) were introduced in the late 50's. In the 40's and 50's regional agricultural irrigation suppliers were a major factor in turf, such as Skinner and Thompson. Toro purchased the California company Moist-O-Matic in

1958 and provided a national source for turf irrigation equipment in addition to Buckner and Rain Bird.

Permanent irrigation heads slowly gained share of market with quick couplers, especially in arid/semi-arid regions where daily irrigation was necessary. Spray, impact and eventually gear-driven heads were developed. Plastic began overtaking metal and asbestos in the 60's for pipe and heads. Installation was simplified by the use of flexible plastic pipe. Computer technology has added flexibility to the controller in the past decade.

While the chemists worked on new fungicides, herbicides, and insecticides in the 50's, a second generation of turf specialists were studying under the first. These new investigators tested the new chemicals as part of their research work. The result was a very productive 60's. Butler, Burton, Daniel, Duich, Engel, Indyk, Kozelnicky, Kneebone, Miller, Murray, Reike, Shoulders, Skogley, Watson, and Youngner improved the market's data base. At the same time they coordinated regional turf field days and conferences further strengthening the turf industry.

They reported on new preemergence herbicides such as DCPA, DMPA, bensulide, siduron, trifluralin, and terbutol. They tested the postemergence herbicides mecoprop, dicamba, dalapon, simazine, and the methanearsenates. They pinpointed the role of nematodes in turf disease and studied the new contact and systemic fungicides. IBDU was evaluated as the second major slow-release fertilizer. They helped turf managers understand the new chlorinated hydrocarbons, organophosphates, and carbamate insecticides.

The 50's and 60's were the introductory years of many improved turfgrasses selected and produced by seed. The first fulltime turfgrass breeding position of Dr. Reed Funk at Rutgers was experiencing great success with new possible grasses.

During this time, the Green Section narrowed its scope of service and established regional technical areas each staffed with an agronomists. Al Radko took the reins from Fred Grau in 1953. At Beltsville, Felix Juska headed turf research until Jack Murray stepped in. Professional golf reached new levels of spectatorship with the skills of



Eb Steiniger

Superintendent of Pine Valley Golf Club in Clementon, New Jersey, since the 30's.



Early gasoline-powered single reel mower. Circa 1920. Courtesy Toro Co.

Hogan, Sneed and Palmer.

Events receiving little attention but important nonetheless were the development of wetting agents for turf, additives for better spray coverage and adherence, colorants, and high impact plastics and fiberglass.

By the end of the 50's, it was clear turf was back on its feet and ready to grow rapidly. To serve the turf manager in areas other than golf, *Weeds Trees & Turf* was launched in 1962. Four years later, *Grounds Maintenance* was started. These publications published news and interpretive articles on the mass of technical data being produced. The market was gaining in professional stature and drew the attention of potential suppliers. Commercial publications assisted these suppliers in reaching the new market.

The graduate students of the 60's are now attaining professor status. It has become their challenge to put all the progress into a digestible and logical form. Stiffer environmental



Jim Watson

Studied under Musser at Penn State and went from there to Texas A & M and Toro to solve irrigation turf irrigation needs.

regulations make their tests more intense and involved. Among this group are Beard, Dunn, Gibeault, Hall, Larsen, Shearman, Smiley, Turgeon and Turner.

The commercial sector began to provide attractive employment for some of these new graduates. It began to pick up some of the research load previously left to the university. Examples are ChemLawn's Miller, Joyner, Martin and Wilkinson; Davey's Funk; Turf Seed's Meyer; International Seed's Pepin; and Loft's Hurley.

The 70's was a decade of questioning existing turf practices. Loss of certain chemicals, resistance to others, and rising costs of water and petrochemicals forced a reevaluation of turf maintenance. Integrated management and lower maintenance levels are being studied for practicality. Better attention to basics like rootzone construction, pH, and drainage may lower dependence on corrective measures.