Reports on Research from Across The Nation

***Technical Speeches at GCSA Meeting in Louisville Point to Progress That's* Being Made in Lab and Field**

Golf's Growth Calls for Steady Advance in Research

By WILLIAM H. BENGEYFIELD
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Mainly due to overcrowded conditions, several Western courses reported over 10,000 rounds of golf played every month during the summer of 1956. This is a lot of golf and presents the supt. with a multitude of problems. He is looking to colleges and other agencies for the solutions to these problems through research.

In 1956 research workers at Texas A&M and UCLA came up with data on soil mixtures for putting greens that will minimize compaction. The 85 per cent coarse sand, 1 1/2 per cent organic matter, and 7 1/2 per cent clay particle was the No. 1 research contribution to Western courses in 1956. Many experimental greens were established using this formula.

What about the grasses? Merion performed outstandingly on tees in the Northwest. It came through the severe winter of 1955-56 much better than any other grass. Alta and Kentucky 31 fescues provided good turf for roughs in the desert as well as in humid areas.

Of the bents, new greens of Congressional, Arlington and Congressional, Cohansey and Pennlu, were established last year. From early observations, all seemed to be an improvement over Seaside. Elmer Border, supt. at Olympic CC in San Francisco, had very good results in plugging Congressional into poa annua greens. Bill Beresford's bent selection, called Los Angeles CC bent, performed well on his course.

Seed of U-3 Bermudagrass received considerable publicity last year but in plot trials it was disappointing. Dr. V. Youngner of UCLA commented that in tests made at his station seeded plants were extremely variable and definitely not U-3 Bermuda.

In the fertilizer field a new material containing approximately 39 per cent potassium was introduced by a Los Angeles ceramic firm. The potassium is slowly released and the product reacts much like Urea-Formaldehyde materials. It may find a real place on light sandy soils, under heavy irrigation.

Weed control is one of the West's weakest points from the research standpoint. Kikuyugrass, English daisies, Dallisgrass, and oxalis are major problems.

With golf enjoying such tremendous growth, we in the turf business must continue, indeed increase, our research activities if we are to have any hope of maintaining even present standards.

Courses Are Trial Plots for Laboratory Findings

By CHARLES K. HALLOWELL
Mid-Atlantic Dir., USGA Green Section

It is normal that there is a preparatory step before the research findings become standard practices on courses. Trial plots or field demonstrations constitute this step. These convince if the new is practical. Demonstrations often show an improved strain of grass growing alongside a strain long in use, or trial applications of herbicides, fungicides or insecticides may determine their action on grasses.

Development of better putting grasses on trial greens by John Monteith, formerly with the green section, and a number of golf course supts., showed that Arlington, Congressional, Cohansey, Collins, Toronto and Old Orchard, were the leading creeping bents.

Pennlu is a stolon bent and Penncross is a seeded bent, both having been developed by H. B. Musser of Penn State. They are now being carefully studied under playing conditions to determine if they are equal or superior to other improved putting green bents.

The Bermudas, developed in Florida and at Tifton, Ga., showed how important it is to continually carry on research work in developing better strains of grasses. Tifgreen shows promise and is being thoroughly tested by members of the Tidewater Turfgrass Assn. U-c Bermuda, after careful testing, is being grown on tees and fairways.

Merion, released more than six years ago, is coming into its own more and more each year. It is a superior grass but has limitations that must be determined by those using it.

Story Behind Aeration

Aeration by power-operated tools called for studying new management methods. First, facts were assembled by supts. getting together and pooling their experiences. Then in 1947, '48 and '49 a summary of the findings of members of the Philadelphia GCSA on how the aerifier assisted in reducing soil compaction and in aiding water and plant

food absorption was distributed to courses in the Philadelphia area.

Research studies came later. Penn State reported on actual figures on increased root growth, the amount of rainfall going into the soil after aeration in comparison to soil showing compaction and how phosphorous was placed in the root zone.

Vertical mowing machines, which aided greatly in removing mat and improving the surface, took many demonstrations before they were adopted.

Japanese beetles arrived in this country 30 years ago and intensified studies on grub control. The application of 3 lbs. per acre of one of the new insecticides and the immediate control of grubs is much different from Joe Valentine's reports on use of so-called insecticides in the early 20's which then were harmful practices. Joe says that when the grubs died so did the turfgrasses.

Research workers first brought forth arsenate of lead, then DDT, followed by chlordane, aldrin, dieldrin and heptachlor. Each one was an improvement on its predecessor.

Fungicides found to have a place in controlling diseases on greens were Tersan and the cadmium compounds. Both were applied by Penn State research workers carrying on studies in the field. Field plots at Merion in 1942 showed the effectiveness of what is known now as Tersan, and in 1948 Bob Mean's work at the Philadelphia CC, in cooperation with Marshall Farnham, determined that cadmium was effective in controlling dollarspot.

The green section's research work showed how effective sodium arsenite was, and still is, in checking weeds. The first work was done by Fred V. Grau, when a graduate student, in the early 30's. Later Mrs. Fanny-Fern Davis, who was in charge of green section's activities during World War II, discovered that 2, 4-D was effective in controlling broad-leaved weeds. It is still in general use today. This work was followed by herbicides developed by Jess DeFrance at Rhode Island U. and others and showed the place of phenyl mercury and disodium methyl arsonate in crabgrass control.

William H. Daniel of Purdue developed facts giving supts. confidence in 2, 4, 5-T to control clover in fairway turf and better guidance in applying arsenate of lead for checking poa annua.

Ureaform fertilizer was offered for general use after studies had been made at Penn State. Plot studies were made at the Experimental nursery; then there were comparison studies on the use of ureaform and known proved fertilizers, these trials having been made on fairway grasses.

Now that ureaform fertilizer is on sale, most of it that is used is being applied to greens. How much to use after application, and how frequently to apply it, calls for further studies which are made from observations, the amount of clippings removed, etc. There has been a demand for additional facts on the use of ureaform. Again, supts. have been liberal in pooling their information on this new source of nitrogen fertilizer used on greens.

Research has been most helpful, and more is necessary, before we speak with confidence on how to get rid of poa annua. There is a strong demand for further facts on what to put into, or substitute, for soil when constructing greens. All of you know of other projects that show the need for more fundamental facts. As research data becomes available it is equally important that demonstrations be carefully carried out under actual maintenance and playing conditions.

1956 Was Great Year for Maintenance Contributions

By ALEXANDER M. RADKO
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1956 was a good year for supts. to try many things they had learned over the years through research, but had held for future use. When things are going well, it is difficult to sell a membership on needed course improvements, but after the hurricane season of 1955 in the Northeast, the membership was psychologically prepared, and the supt. had the opportunity to set wheels in motion to make necessary changes suggested through research.

The use of select vegetative strains of creeping bentgrass has increased sharply. Most prominent among these has been use of C-1 Arlington and C-19 Congressional strains. Many new plantings of this mixture were made in nurseries or directly into greens. A notable example of the expanded use of these strains: an original planting of 6,000 sq. ft. by Arthur Anderson of Brae Burn CC, West Newton, Mass., has been used to plant 100,000 sq. ft. of putting turf in various courses in the Boston area. During the past two years, local comercial growers of C-1 and C-19 creeping bentgrass were unable to keep up with demand. These creeping bentgrass strains have been working out very well where tried.

Penncross is Popular

Demand for Penncross seed for putting green purposes also has been on the upgrade. Several nursery putting green plots have been installed for observational purposes. Supts. are enthusiastic about turf cover obtained. Texture, color, and quality generally have been most encouraging. The demand for seed in 1956 exceeded the supply . . . many more supts. would have tried it if they could have obtained Penncross seed.

Use of Merion bluegrass on tees has been on the upgrade. During the tough year of 1955, Merion bluegrass stood up better than most other cool season grasses at several courses in the Northeast. As a result, many new tees were planted to this strain in 1956.

Putting green diseases were a major problem

in 1956 because of exceedingly high and persistent humidity. It seems that every known disease was troublesome, even common diseases such as brownpatch and dollarspot.

Curvularia, pythium, and helminthosporium outbreaks were more numerous in 1956 than they had been in some years. Curvularia continued to be troublesome and a difficult disease to control. Various chemicals were tried with varying degrees of success and this led to supts. trying "shot-gun" mixtures of mercuries and Tersan, or mercuries, Tersan and cadmium.

Malachite green was used with success in checking spread of pythium. This dye product which has fungicidal qualities was recommended by Frank Howard of the University of Rhode Island for checking mycelial growth of pythium.

Results Called Inconclusive

The broad spectrum fungicides were used widely, but there are mixed feelings regarding results. Some supts. felt that excellent results were obtained with these new products; others felt results were disappointng. More practical work and observation of results are needed before we can say much about the use of this class of fungicides in the Northeast.

The urea formaldehyde fertilizer products received wide application throughout the Northeast. Many tested it on a limited scale. Here again, results were inconclusive.

There was a decided trend toward increasing the sand content of topsoil mixtures in building new greens. This trend is also evident in topdressing mixtures. Supts. are getting away from the old formula of 1/3 sand, 1/3 clay , and 1/3 organic matter in favor of a high percentage of sand. Research investigations of O. R. Lunt and Raymond Kunze, although conducted separately, generally agreed in findings. They have been widely read in the Northeast and many supts. have made adjustments in topsoil and topdressing practices as a result.

These are but a few of the highlights of recent developments in the Northeast. Results of research are slow in coming through educational institutions, sometimes painfully slow. Often after results of research are released, there is a further time lag before supts. get the opportunity to put these findings to work. However, research certainly is helping them make progress toward the goal of better turf for better golf.

Dogwood Tournament

Qualifying rounds for the annual Dogwood Invitational tournament to be held at Druid Hills GC in Atlanta, Ga., will be staged Apr. 7-10 with championship play starting on the 11th and extending through the 14th. An amateur event, the tournament will have A and B divisions of championship flights plus 12 other flights.

New Approach to Reducing Compaction in Putting Turf

By J. R. WATSON, Jr.

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The study of soil compaction, its alleviation and relationship to turfgrass growth has received much attention from research workers in the past. More recently, a somewhat different approach has been undertaken, particularly in regard to the compaction of putting green soils. Efforts have been directed toward determining the mechanical composition of a soil mixture which resists compaction, yet supports desirable turfgrass growth. The work of two investigators, Raymond Kunze in Texas and O.R. Lunt in California, will serve to illustrate current status of developments in this field.

Raymond Kunze, studying under a fellowship grant by the USGA green section at Texas A. & M. College, completed a study during 1956 in which the primary objective was to synthesize a mixture of sand, soil and peat that would resist the effects of compaction, yet produce good turfgrass growth. Ratios of sand, soil and peat studied were 6-3-1, 7-2-1 and 8½-1/2-1 by volume. Percentages of sand (60, 70, 80 and 85) were made up of varying sizes. The soil used was a Houston black clay, which inherently contains 60 per cent clay, 10 per cent silt and 30 per cent sand. The peat content was constant in all mixtures — ten per cent by volume was used.

Kunze concluded from this study that: (1) A mixture containing (by volume) 80 to 85 per cent sand (all sizes), 5 to 10 per cent of a well aggregated clay soil (60 per cent clay) and 10 per cent peat met the requirements set forth as the primary objective. (2) Some compaction was beneficial when applied to mixtures containing 10 per cent or less of clay soil. Such mixtures, when compacted, produced the largest amount of top growth. (3) Differences in particle size of compacted soil mixtures produced significant differences in the amount of top growth. The smaller the particle size, the less top growth produced. (4) In compacted soil mixtures, root growth increased as particle size decreased. (5) Yields of root and top growth did not correlate.

O. R. Lunt of the Department of Irrigation and Soils at UCLA reported "A Method for Minimizing Compaction in Putting Greens" in the July, 1956 issue of "Southern California Turfgrass Culture." This work likewise was supported in part by a grant from the USGA green section. From tests, Lunt demonstrated that soil mixes containing as much as 80 per cent sand could be compacted so that percolation rates became low. When sand content of the mixture was as high as 90 per cent, compaction treatments

(35 pounds per square inch) did not reduce percolation rates to low values. He concluded that, in all probability, 85 per cent sand in a putting green would maintain high infiltration rates, provided sand particle size distribution was right. He suggested that the sand contain at least 75 per cent of the particle sizes in the 0.4 to 0.2 millimeter range, and not more than 6 to 10 per cent in the range smaller than 0.10 mm., and not more than 1 or 2 per cent of silt and unaggregated clay. Using a mixture of 85 per cent sand, principally in the 0.42-0.21 mm. range, 7.5 per cent aggregated Krillium treated clay, and 7.5 per cent peat by volume, Lunt demonstrated the ability of soils to maintain infiltration rates in excess of one (1) inch per hour after having received a compaction treatment.

Through other tests, it was shown that compacted layer on putting greens occurred in the upper 2-ins., and that maximum compaction occurred in the top 1½-ins. He next determined mathematically, and demonstrated by rather ingenious laboratory studies, that a 4-in. layer of sand on top of a soil susceptible to compaction would protect soil underneath from compaction.

Lunt points out that when constructing a green over which a sand layer will be placed, it is important to prepare the underlying soil so that it will possess good physical properties and be well drained. It is not necessary to mix the sand layer with the underlying soil. According to Lunt, it would be desirable to incorporate Krillium at a rate of 7.5 lbs. per 1000 sq. ft. into the underlying soil. An experimental green has been constructed along those lines at UCLA and records are being taken on its performance. To date, infiltration rates have remained high and the quality of turf is satisfactory.

Both Kunze and Lunt have pointed out that blending of 5 to 10 per cent well aggregated clay, and approximately 10 per cent peat into the sand mixture improves water holding ability and fertilizer retention. Lunt indicates the fertilization program will have to include frequent applications, or use of fertilizer materials of low solubility which do not leach rapidly. Deeper rooting can be expected in sand greens, and indications from the UCLA experimental green are that two irrigations per week are adequate to support growth during hot weather.

When preparing a soil mixture along the lines suggested by Kunze and Lunt, the type and amount of topsoil is of prime consideration. Kunze used a clay soil of exceptionally high clay and low silt content. This soil in its natural state is very well aggregated. Lunt, likewise strongly emphasizes the necessity of using a well aggregated clay soil, and further the importance of good physical properties in underlying soil. He also points out that any topdressing after the green is built should be done with a mixture of the same composition as that of the surface with which the green was constructed. Both investigators were working with soils of extremely low silt content. The undesirability of this fraction should be emphasized. The extreme variation which exists in topsoils in various regions make it mandatory that the proportions of sand, silt and clay naturally present in the soil be carefully considered, and that the proportionate volumes of sand and soil be based on an analysis of the soil. For example, Lunt states that if it were the objective to construct a green containing approximately 10 per cent by volume of peat, 7.5 per cent of aggregated clay and 82.5 per cent sand, and if the clay content of the soil were 50 per cent, then to obtain the proper proportions, 15 per cent of the prepared soil, 10 per cent peat and 75 per cent sand should be blended.

Preliminary investigations are underway at Purdue University in which moderate temperature clays are being studied as a soil substitute. William H. Daniels reports that these materials have a very high capillary absorption and a very high large (macro) pore area. To date, very preliminary studies have been made and no conclusions are available.

Earthquake—What's That?

Not snow, nor rain, nor heat . . . Which is fine for postmen.

But what about golfers? Art Glaser, starter at Harding Park GC, tells how he was having trouble getting players up and off the first tee the other day in San Francisco, minutes before the first tremor was felt. When he recovered his aplomb following the quake, Art's first thought was: "Well, maybe these guys'll get off my neck now."

But nary a golfer fled. Within a few minutes, the players were back clamoring to get the foursomes on the fairways.

Some players reported that otherwise impossible putts dropped when the earth rumbled. One geologist is reported to have said that a golf course probably is as safe a haven as any during an earthquake.

Make Reservations Now

Dick McGeorge, press chmn. for the 1957 Open, which will be held at Invernesss in Toledo, June 13-15, suggests making room reservations now if you are planning to take in the tournament. There will be a scarcity of hotel rooms and motel rooms in and around Toledo by the above date.