

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 disappointing. 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

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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

## 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.

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.

## Make Reservations Now

Dick McGeorge, press chmn. for the 1957 Open, which will be held at Inverness 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.