

rainfall or intensity of irrigation.

The practice of purposely making subsoil underlying a green impermeable and depending upon tile drainage for excess water removal has considerable appeal. This technique would greatly increase the water-holding capacity of the sand. If the sand depth were 15 to 20 ins. it would not be difficult to prepare mixes having 10 or more ins. of favorable air and water relations.

#### Air Space Factors

Fig. 2 shows that incorporation of coarse organic material such as horticultural grade peat affects soil structure principally in the range of pore sizes which drain in the range of about 0 to 10 ins. from water level. Thus, Fig. 2 shows that an 0.3-0.2 mm sand would have about five per cent air space 10 ins. from a water table. If 50 per cent peat by volume had been incorporated, the air space at 10 ins. from the water table would be about 24 per cent.

Incorporation of moderate amounts of clay in sand-soil mixes will increase capacity of the mix to retain most fertilizer elements. It will increase water-holding capacity of the soil somewhat, especially if deep soil conditions exist (i. e., drainage is satisfactory underneath the sand).

#### Stabilize Clay Aggregates

This can be done by blending well aggregated, structurally stable clay soil in the proper amount. Use of krilium to stabilize clay aggregates is recommended. Kunze et al. consider clay contents in excess of about four per cent undesirable. In lab. tests Lunt reported infiltration rates could be maintained in excess of 1 in. per hour after compaction treatments, even if as much as 7.5 per cent krilium treated clay were present. Probably one of the principal reasons for the unsatisfactory performance of some high sand content greens has been inclusion of too much silt or clay, particularly when these fine fractions are not aggregated.

#### Kunze Green Mix

Kunze et al. (2) reported success with green mixtures of 8-1-1 or 8 1/2-1/2-1 sand-soil-peat mixtures. Soil used was Houston black clay. Clay contents by weight exceeding about four per cent appeared to be undesirable. This is in reasonably close agreement with other proposals. Kunze et al. also reported best growth of grass when the sand-soil-mix was composed of particles in the range of 1 to .05 mm. It is my opinion that under most conditions slightly finer grades of sand would be more desirable. The data in Fig. 1 show that if the subsoil is impermeable, a sand layer 16 to 20 ins. deep will provide 6 to 10 ins. of soil well aerified if sand is in the range of 0.4-0.2. If the sand layer is shallower (subsoil drainage poor, tile drained), sand should be coarser. If subsoil drainage is good, then an increase in the sand fraction from 0.2 - 0.1 mm. would be desirable. The precaution previously urged that sand mix contain not more than about 6 to 10 per cent sand, silt, or unaggregated clay in the range smaller than 0.1 mm, still applies.

## Growing Turfgrass the Hard Way

By TOM MASCARO

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If I were asked what the major turf problems were, I would say that they are problems over which the supt. has little or no control. They are problems created by employees, committees and nature.

Problems created by employees would perhaps take the No. 1 place. There are many cases of improper mowing practices, improper use of equipment and improper use of fertilizers and chemicals. Most all of these are caused by misinformation or lack of competent help.

Take, for instance a golf green: Incorrect mowing can upset the most perfect greens program. Green design is changed by workmen who, rather than follow original contours, will chop straight lines in order to get done faster. Turning of the mowers is done on the green rather than on the collars, creating problems. Poorly adjusted and dull mowers on both greens and fairways create many problems.

Then we have the misuse of fertilizer. Spreaders may be incorrectly calibrated or get out of adjustment. Too much or too little fertilizer may be applied. The misuse of chemicals is quite evident, especially the weed control chemicals. Workmen who are not familiar with the potency of some of these products are left to apply them without regard to their effect on the good grasses.

The supt. also is faced with watering problems. Workmen who receive careful instructions suddenly decide they know better than anyone else and apply water their own way. Areas that badly need irrigation sometimes are skipped because the man happens to be just too tired to do it.

The supt. who grows grass the hard way also is faced with players and committees. Each, in turn, has his own theory as to what is best for grass and is constantly badgering the supt. with ideas. Trees are to be planted and trees are to be removed; traps should be dug and traps should be filled; benches should be constructed and benches are an eyesore. If a club has 350 members then the supt. should mow turf at 350 different heights.

Then to top it off, the supt. is faced by acts of nature: things such as floods, lightning, wind storms, skunks and gophers, to name a few. Sometimes it's a wonder to me that about 75 per cent of the supts. don't go over the hill. They'd be justified in doing so.

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### Great Lakes Bantam Tourney

The second Great Lakes Invitation Bantam tournament will be held Aug. 27-28 at the Barberton (O.) Brookside CC. Competition for both boys and girls will be held in the 10-12 and 13-15 year age brackets.