NEW METHODS OF RENOVATING TURF GRASS

By Wayne C. Morgan

AERIFICATION for the mechanical breaking of compacted surface soil and matted turf has been an accepted and regular practice on many golf courses and other turf grass areas for many years.

A reduced oxygen supply resulting from soil compaction and overwatering can limit the growth of grass roots severely Under low oxygen conditions, potassium and phosphorus in the plant shoot is decreased. Sodium accumulation in high concentration, which is undesirable, was found in the shoot of a plant growing under low soil oxygen.

Soil compaction decreases the large pore space in soils, resulting in restricted water penetration. Alternate layers of soil and organic material on old golf greens may build up to four to six inches deep, and will reduce movement of water through the surface soil.

During the winter of 1961, Hemstreet and Dorman, of the University of California Agricultural Extension Service in San Bernardino County, successfully tested a new technique, " deep aeration," for the renovation of old, weak golf greens. Results of this trial showed significant increases in turf vigour, appearance, rooting depths and water infiltration. Water puddling on the green was reduced, as were the frequency of irrigation and total amount of water used. At the Santa Anita Golf Course in Arcadia (owned by Los Angeles County), an old weak green which had been removed from play every summer for the past seven years was selected to further test this new method of deep aerification in 1964.

After a sprinkler can test, when the sprinklers were operated for 15 minutes, water remained puddled on the green for over one hour When the trials were completed, the superintendent reported that even when water was applied for 45 minutes, there was no water standing on the deeply aerified areas.

Plugs of soil on 3-inch centres were removed with a 1-inch-diameter soil tube to a depth of six inches. Treatments consisted of backfilling the holes with a soil mix containing 6 parts fine sand, 1 part nitrohumus, and 3 parts of either peat moss, lignified redwood sawdust, or calcine clay These treatments were compared to mechanical aerification with $\frac{1}{4}$-inch thatch spoons, holes left open, every four weeks from May through August.

The green was overseeded with Seaside bent at the completion of the work. Approximately two weeks after the holes were backfilled, the turf had completely filled over the holes. The green was reopened to play in early June, following completion of the work. Within three weeks, the green had to be closed again as the course superintendent said the turf in the check and machine-

aerated plots was dying. There was no weakening of the turf observed in the deep aerification treatments.

Soil samples taken for rooting depths about three months after the work was completed revealed that there were dense masses of roots to the full depth of the deep aerification holes. There didn't appear to be any significant differences in rooting with any of the deep aerification treatments. Numerous new roots were noticed in the one-quarter-inch machine-aerified holes which were left open. Very few roots were found in the undisturbed columns, a condition similar to the rooting of the turf before the trials began.

Measurements to determine the oxygen status within the soil were made. The results indicated insufficient oxygen for healthy root growth and development in all of the turf soil except where the deep aerification was done. This could explain poor root growth in the compacted surface soil but does not necessarily eliminate mechanical resistance of the soil as an addition factor affecting root development. This becomes even more significant when it is realised that this was the maximum oxygen in the soil that could be obtained as the turf was to be irrigated that night after a longer-than-usual dry period.

Water infiltration measurements showed there was a significant increase in the water infiltration rates of the deep aerification holes when compared to the mechanical-aerified plots. An observation that may be of significant value is that pertaining to the amount of annual bluegrass, *Poa annua,* in the green. Before treatments were begun, it was estimated that greater than 50 per cent of the green was *Poa.* After the deep aerification treatments and overseeding with Seaside bentgrass, the bent could be seen first growing over the deep aerification holes. By mid-August, there was a significant decrease in the *Poa annua* with a corresponding increase in bentgrass.

Discussion Prices vary so much for the installation of new golf greens, it is difficult to arrive at an average figure. The size of the green, sprinkler system requirements and drainage needs must be considered. Whether all the work is to be contracted or only partly contracted, or is to be done by the regular work force at the course, will also affect costs of the green.

Let's assume that an average green to rebuild entails a cost of about $2,500 for a 5,000 sq ft. green. If deep aerification costs approximately five cents a square foot, this would be only about one-tenth of the cost to rebuild the green.

When a golf or bowling green is being rebuilt, it requires that the green be taken out of play for up to five months. With deep aerification, the turf can be used again as soon as the work is finished, although it would probably be beneficial to allow the turf two or three weeks to completely fill in.

Savings of water costs may contribute substantially to help pay for the deep aerification. It is entirely possible that with a deeper root system less frequent watering could result in water savings from 25 to 50 per cent or greater If watering is done manually, there could also be substantial savings in irrigation labour costs. Other savings from fertilisation, disease and weed control may also be possible.

With grateful acknowledgements to the Golf Course Reporter