(Drainage cont'd.)

rebuilding operation at Aurora Country Club lost two or three weeks so that planting is very late and will require some kind of winter protection. The new River Run course in Kohler, WI has lost a season of play becuase of the tremendous amount of erosion in spite of excelsior matting on steep slopes.

What lessons can be learned from the three states of water damage this year?

1. Internal drainage is useless in frozen soil. Thaw water must move across the surface.
2. Internal drainage is priceless in getting oxygen needed for respiration to the root system.
3. High relative humidity significantly slows evaporative cooling in the daytime and reduces radiation cooling at night.
4. Evaporation is aided by air movement, especially under conditions of high relative humidity.
5. The climate in which turfgrass producers are interested is only a few inches high. We don't worry much about the waving of the flag, but how far down the flagpole the wind effect goes.

Water must move through and off the surface of the soil, quickly. This means more drainage is needed than **any** present golf course manager or **all** his predecessors ever thought about. Why? Just plain preventive management. Can anyone imagine how much havoc would have been wreaked if there had been **no** drains?

Early season (March) soil sampling forcefully brought anaerobic soil conditions to the attention of anyone who put the aromatic cores into a warm room. Later October inspection of aerifier cores showed the same. They were all over the place in mid-July. Not all of these "Black Layers" were in greens, either. They can occur anywhere that organic matter exists in an oxygen-depleted environment. Don't blame the well drained sand topdressing, but the impervious soil below it. Don't blame the anaerobic microorganisms which generate the hydrogen sulfide and related aromatics, blame the excess of water or really, the inadequately drained soil or the layer of thatch covered up by topdressing. The anaerobes only mirror the soil condition. Get air into the soil and the problem will go away.

Blame, however, should not be foremost in the mind of anyone in golf course management after this season. Sensible thinking would consider the 1986 season as being a guide to the design and installation of the ultimate golf course drainage system. It also demands a reassessment of fungicide plans to always have at hand an emergency program in which specific, **nonsystemic** fungicides can be used. And now that winter weather is upon us, the firewood opportunity presents itself to those whose turf was subjected to inadequate air movement because of undergrowth and/or trees. I hear of many incurable tree diseases this fall.

The 1986 season had no respect for location, budget, play history or age. The survivors were blessed with permeable soils, or better than average surface drainage, or an ongoing thatch management program, or the **good sense** to close the course, quit mowing and allow the grass to stay alive. The real losers are those who tried to make the grass do their will.

We all learned a great deal this year. If we retain the principles taught by this lesson, our turf will not have died in vain. If we do not, we'd better move to Madison or Green Bay.

Threshing the Journals

Tolerance of Tall Fescue and Kentucky Bluegrass to Chlorsulfuron Under Field Conditions

by B. M. Malloy and N. E. Christians

A new herbicide that is 10 to 100 times more active than most weed killers has been labeled by DuPont for selective control of both broadleaf and grass weeds in cereal crops. This herbicide, Glean, contains chlorsulfuron.

Since tall fescue is a very difficult species to control selectively in a bluegrass turf, chlorsulfuron has been evaluated at Iowa State University for tolerance levels of both species. Parade, Adelphi, Glade and Rugby Kentucky bluegrasses and Kentucky 31 fescue were treated in field experiments with chlorsulfuron. The following results are of interest:

—Kentucky bluegrass can tolerate rates of chlorsulfuron in split applications 14 days apart up to 6 ounces per acre (424 grams per hectare) without showing serious detrimental effects.

—As the chlorsulfuron rate of application increases, clipping weights of Kentucky bluegrass decrease, although turf quality was not affected.

—Tall fescue was severely damaged by chlorsulfuron at rates of 2 ounces per acres (141 grams per hectare).

—Chlorsulfuron works very slowly, particularly following fall applications. Four to seven weeks to achieve complete kill of tall fescue is common.

—Kentucky bluegrass can be seeded into treated areas the season following application of chlorsulfuron.

Credit: Weed Science, 1986, Volume 34, Number 3