LOCALIZED DRY SPOTS: CAUSES AND CORRECTIONS

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The occurrence of severe localized dry spots in turf is seldom observed on extensive areas. However, this problem developed to a significant magnitude during 1971 on some golf courses located on sandy soils in Northern Michigan. It persisted in 1972 in spite of frequent rains during much of the summer.

Several causes for localized dry spots have been suggested (Beard). One is the tendency for the thatch layer to dry out and become hydrophobic; that is, it sheds water instead of allowing the water to wet the thatch and pass through.

In other cases, dry spots may be associated with poor water distribution from the irrigation system. Causes may be wind, inadequate design of the irrigation system, worn or damaged irrigation equipment, or the application frequency and intensity of irrigation.

Physical soil limitations may also lead to spotty turf responses. Soil variability or soil restrictions to rooting and water penetration may be involved. Infiltration rates can be limiting on sloping soils causing insufficient water to enter the root zone. Soil compaction, especially common on soils high in silt and clay, also reduces infiltration as well as limiting root growth.

Another cause may involve fungal activity in the soil. The fungal mycelia and products they give off are thought to cause a hydrophobic soil condition. This problem has been identified and studied on some of the dryland pastures of Australia (Bond). The water from infrequent rains enters the soil only in spots where the fungi have not been active. This causes limited grass growth and inefficient water use. It is thought that several different Basidiomycete organisms may be involved.

The problem in Michigan was determined to be a hydrophobic soil condition and was not compaction. This hydrophobic condition was found at Boyne Highlands, Harbor Springs, Michigan, on greens, fairways, and roughs with no apparent predictability.

Solutions for the localized dry spot problem depend on the cause (Beard). Improved water distribution and irrigation practices, thatch control, cultivation and wetting agents are usually suggested. Cultivation practices such as coring or spiking must penetrate the hydrophobic soil layer so that water can penetrate. Water was allowed to stand in shallow coring holes in the hydrophobic spots at Boyne Highlands for 30 minutes or more with little penetration into the soil. A series of coring and wetting agent treatments were initiated during the late summer period of 1971 by J. B. Beard. Water infiltration rates were improved most where wetting agent and coring treatments were applied in combination. Five different wetting agents were used with small differences among wetting agents being observed.

Soil samples brought into the lab in the fall of 1971 were studied for wettability. It appeared that there were some differences among wetting agents at the 2 to 4 inch soil depth. There was little effect of wetting agent treatments on soils taken from the 0 to 2 inch soil depth, however, this is the layer which must be wetted in order for water from irrigation and rainfall to penetrate.

Several wetting agent studies as well as a limited number of coring treatments were initiated in 1972. On one set of plots up to two times the label rates of several different wetting agents were applied during early summer followed by monthly applications at label rates. No injury to the turf was observed by these treatments, although some selective thinning of Penncross creeping bentgrass was observed on fairways with Adjuvant-T during 1971.

There was limited recovery of the turf on both treated and untreated soils during 1972. Wettability of the soil was determined by the percentage of water in the soil. The dry spots persisted in spite of frequent rains. Soils were quite dry on some treatments plots during one sampling even though 2 inches of rain fell over the previous 2 days.

Conclusions from these studies to date are:

1. Localized dry spots persisted in spite of a wet year characterized by frequent rainy periods.

2. There were differences in wetting ability among the wetting agents although the soil moisture data indicated considerable variability in responses between dates of sampling and plots.

3. Techniques for applying the wetting agents and watering them into the soil can be very important.

4. No phytotoxic effects were apparent in terms of shoot growth injury during 1972 even at 2 times the label rates. This was not true in 1971.

5. The turf must show recovery in order to fully evaluate the wetting agents. To date this recovery has not occurred consistently even though the wetting agent may have increased the water content of the soil.

6. Coring is effective in improving water penetration of the soil with the timing, spacing and depth of coring being critical. The coring machine must have the ability to penetrate the dry, sandy soil sufficiently to allow the water time to rewet the soil. Fairway coring units seldom penetrated more than 1/2 inch on such areas. A more effective depth would be 2 inches or greater with a spacing of about 4 to 6 inches between cores.

7. Soil moisture was highest when both coring and wetting agents were used. This substantiates the 1971 results.

These studies will be continued during 1973 in cooperation with the Boyne Highlands group.

Literature Cited

Beard, James B. 1973. Turfgrass; science and culture. Prentice-Hall, Inc. Englewood Cliffs, N. J.

Bond, R. D. 1968. Factors responsible for water repellence of soils. Proc. of Symposium on water-repellent soils. Riverside, Cal. pp 259-264.