

HOT OR COLD WATER?

By JOHN MONTEITH, Jr.

... turf not affected, according to Green Section experiments.

EVERY summer the Green Section receives requests for information concerning the harmful effects of hot water from open pools or reservoirs and of cold water from deep artesian wells or springs which is used in watering the turf, especially the putting greens. In some cases the greens show injury from some obscure cause. Vague suggestions have come from some indefinite source that perhaps the very cold well water or the water from a pool exposed to the sun, whichever is used on the golf course, has something to do with the injury of the grass. These suggestions grow in importance, cultivated and encouraged by locker-room conversations. They sometimes even get the apparently considered approval of the greenkeeper or manager. At times the water temperature theories have been further stimulated by more elaborated dissertations.

These theories should of course be entirely harmless and could be easily set aside among the large collection of amusing alibis of golfiana. However, they take on importance when it is realized that some may go to great expense, using money urgently needed elsewhere on the course in order to obtain a different supply of water which will be what they believe to be a more desirable temperature. These theories also work some hardship on the greenkeeper whose water supply happens to be of average temperature, neither too cold nor hot, for he is deprived of a very convenient alibi for many of his turf disorders.

Hot Water Never the Cause of Brown-Patch

Even brown-patch has been attributed to the use of a cold or hot water supply. Since brown-patch attacks are usually coincident with hot weather the obvious conclusion is that the hot water must heat the grass and thereby make it more susceptible to the disease. On the opposite side are those whose water supply is very cold. Yet they too arrive, in a very

roundabout manner, at the same conclusion. In some mysterious way the fungus is encouraged, especially in hot weather, because, according to this distorted theory, it is supposed that the cold water lowers the temperature of the grass and thereby stimulates the development of the disease. Unfortunately, there are those who will go to such lengths that they will appropriate funds to make costly changes without working out any of the practical possibilities of these ideas. Needless to say those who indulge in such theories never take the trouble to check up on the actual facts of the matter.

Make Water Temperature Tests At Arlington Plot

Some time ago, at the Arlington turf garden, the Green Section made some tests concerning the effect of water temperatures as related to the growth of grass in midsummer. Tests were conducted to find out the actual number of degrees the temperature of the turf was lowered when ice water, to give the extreme, was used. Water at 32°F. was applied from a sprinkling can held close to the turf and the temperature was recorded before and after the application. The decrease in the temperature in tests made both during the early morning and in the afternoon heat varied from 5 to 12°. Using ordinary water the temperature of the turf was reduced 2°. In one test the water was pumped from a power sprayer through a $\frac{3}{4}$ " hose 100 ft. in length. The temperature of the water in the tank was 32°, at the end of the hose, 46°, even after running long enough to cool off the hose. When thrown through the air by means of an ordinary rotary sprinkler and caught in a pan, the water registered 76°. The turf, after applying this ice water by means of the sprinkler at an amount equal to 2½ inches of rainfall, was 76°. The air



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temperature at the time was 80° and the temperature of the turf before the application of ice water was 78°.

Water Quickly Takes Air Heat

It is apparent that when water is sprayed through the air it rapidly takes on so much heat from the air that the effect on the temperature of the turf is approximately the same as that of normal temperature water or, in other words, practically negligible.

Furthermore, even when the turf was sprinkled with ice water from a sprinkling can with the minimum exposure of the water to the air resulting in the maximum reduction of temperature, the turf very rapidly returned to its original temperature.

If the water supply of a golf course is obtained from a reservoir exposed to the sun, it is often assumed that the water must be rather hot. This assumption is made in spite of the well known fact that large bodies of water have a cooling effect on surrounding territory. The exposure of a body of water to the sun's rays tends to increase surface evaporation. The temperature of the water below the surface is more slowly affected by the heat of the sun. Surface evaporation is the working principle of iceless refrigeration. As army men and campers know, if a material to be cooled is covered with some kind of cloth which is kept moist, such as a canteen or a desert water bag hung on the outside of the car, the evaporation of the water from the cloth will tend to lower the temperature of the contents inside the container. Thus, although the reservoir is exposed to the sun, there is a constant check on the rise of the temperature of the water due to the cooling effect of evaporation.

Heated Water Does Not Scald Turf

Tests have been made at the Arlington turf garden to determine the effect of hot water on grass with a view to determining how much of the so-called scald might reasonably be attributed to the high temperature of the water used.

To determine the possible increase in temperature due to exposure to sun on stagnant water a metal 10-qt. bucket of water and a 25-gal. wooden keg were filled with water and exposed to direct sunlight in a place protected from wind. It is well known that small bodies of water heat up

faster than larger bodies. The metal bucket could therefore be used for an extreme case. At midday when the air temperature was 90° F. the water in the 25-gal. tub was only 92°. The temperature in the bucket was 99°. Therefore it is unlikely that any of the water from reservoirs on golf courses reaches a temperature higher than the maximum air temperature.

Grass Withstands Abnormal Water Temperatures

A test was made to determine what water temperature grass is able to withstand. One gallon of water was poured with a sprinkling can on each plot of 16 sq. ft. of bent turf. This was applied at the rate of 320 gal. to an average green of 5000 sq. ft. The sprinkling can nozzle was held close to the turf to give as little chance as possible for the temperature of the water to change before reaching the grass. If thrown through the air by means of an ordinary sprinkler the temperature of the water would approach air temperature with much the same speed as in the case of the ice water test described above.

The air temperature at the time of the

test was 90° and there was bright sunlight in early afternoon.

One plot was tested with water at 150° F. The rapid application of the water resulted in raising the temperature of the grass 18°. However, the thermometer rapidly fell and within five minutes it was back to the normal temperature. Even this hot water failed to injure the grass in any way.

Other plots were treated with water at 175° and at 200° F. Even at the higher temperature the increase in the temperature of the mat of grass at the surface was only 32°. This also dropped quickly and within a few minutes was back to normal. The grass was scorched in both of these plots but it was not killed even by the water at 200°. It is quite possible that under certain conditions some turf injury might have occurred at 150°. However, these tests certainly indicate how improbable it is that any damage may occur from sprinkling greens with water that is too hot.

Therefore it is safe to state that the temperature of any water supply is not an important factor in turf maintenance.

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often attributed to hot or cold water can usually be traced to the use of an excessive quantity of water. Sometimes an improvement is noticed after a change to another source of water has been made. The benefit in these cases is usually imaginary. In some cases they may be due to the fact that the new supply is used more sparingly for the simple reason that it costs more.

There are also some well waters which contain salts that are toxic to grass, and of course these should be avoided.

To summarize these water problems we can say that temperature of the water supply is of no significance. The mineral content is occasionally important. The quantity of water always is important.

ANNUAL TURF FIELD DAY will be held at the New Jersey Agricultural Experiment Station, New Brunswick, N. J., beginning at 2:30 P. M., Monday, August 10. All persons interested in turf are invited to attend.

Special feature of the day will be the testing of soil samples to determine their deficiencies for production of healthy turf.

GOLF'S MARKET PLACE

Eighteen Dunlop balls were balanced delicately in a shop window on the new liner Queen Mary. The balls retained their balance during the initial round-trip. Demonstration of the Queen Mary's smooth riding was talk of the trip.

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