

# Survey of 1933 Maintenance Gives Economy Lessons

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IF A DIARY of weather conditions in general, with their effect on putting green turf, had been kept in the golfing districts of the United States for the past six summers, it would read somewhat as follows:

1928. Hot weather with high humidity; much loss of turf.

1929. Normal summer. Little turf injury.

1930. Heat records made all over country; low humidity and rainfall. Little turf injury.

1931. Not as hot as 1930, but wide distribution of high humidity. Considerable loss of turf, especially in Middle West. A great deal of injury from sod webworms and cutworms.

1932. Normal summer. Little turf injury.

1933. Low rainfall in the Middle West with comparatively little turf injury. Several periods of continued heavy rainfall and high humidity in the East, with bad turf injury. More or less sod webworm and cutworm injury throughout the country.

It seems evident from the above observations on weather conditions and injured turf that periods of high humidity accompanied with hot weather are the most disastrous on putting green turf. During these periods it is always noticeable that poorly drained putting greens are most badly injured. Turf is often killed entirely on the lowest or worst drained portions of the greens. If turf is sufficiently lacking in proper drainage even the hardiest of grasses will die, but it is quite evident that at these times annual bluegrass (*Poa annua*) is the worst sufferer. A beautiful grass and good grower in the spring and fall, *Poa annua* is not a good hot weather grass and requires very careful attention throughout the summer. If it is subjected to high humidity in hot weather, it becomes very weak and sickly and the poorly drained areas are almost certain to die.

Another contributing cause to the loss of both *Poa annua* and bent grass on put-

ting greens during periods of extreme humidity and heat is over-fertilizing. Apparently fast growing and lush turf, such as may be caused by heavy nitrogen feeding, is so weakened that the sudden combination of high humidity and heat is too much for it.

As mentioned above the country was pretty well split as to weather conditions in the past summer. It was dry through the Middle West and it was easy to control the moisture on the greens; hence there was little trouble from high humidity. In the East however two periods of excessive humidity and heat were felt, one early in the summer and another more than a month later. Both of these periods brought grief to greenkeepers.

Although the country was divided as to general weather conditions, it is understood that there have been local weather disturbances in the West this summer which have brought to these particular localities the more general weather conditions reported in the East and likewise some small sections of the East may rightfully claim, for part of the summer at least, conditions similar to those reported in the West. Then there are always golf courses upon which, no matter how dry the weather, the turf is made to suffer from an excess of water artificially applied. There are also courses upon which putting greens have suffered from lack of water, even though the weather reports in that section show high rainfall. Therefore the following comments on the turf ills of 1933, causes, and suggestions for prevention or cure, should in one point or another be of interest to greenkeepers East or West.

## Brown-patch Active.

Periods of heavy rainfall in the East followed by hot weather made fungus diseases active and greenkeepers were put to considerable worry and trouble to keep the attacks of disease under control. At such times both dollar-spot (small brown-patch) and brown-patch (large brown-patch) became very active. Many greens had been

treated with calomel to control dollar-spot, which may be expected even in cooler weather, but a new problem presented itself when the greens were badly attacked during these extremely humid and hot periods with brown-patch also. Calomel controlled dollar-spot effectively but was too slowly soluble to check brown-patch and greenkeepers were forced to resort to applications of the more soluble, and hence more active, bichloride of mercury. Some greenkeepers had to repeat light treatments several times in a week to keep brown-patch under control. It was proven in many instances that persistent repeated treatments of bichloride saved many putting greens. Greenkeepers who treated once or twice and then gave up further treatments when the brown-patch continued to be active lost a great deal of turf. Putting greens which had been treated previous to rainstorms with calomel or mixtures of calomel and bichloride of mercury for dollar-spot were less severely injured with the occurrence of brown-patch than greens which had not been treated for sometime, as, although the calomel did not entirely prevent brown-patch, it had considerable effect and the brown-patch did little damage before bichloride could be applied.

When brown-patch first occurs an application of one or two ounces (according to the severity of attacks) of bichloride of mercury to 1,000 sq. ft. should be made, but if the disease again becomes active within a week a further application of from  $\frac{3}{4}$ -ounce to  $1\frac{1}{2}$ -ounces of bichloride of mercury is usually sufficient to check it.

### Dollar-spot and Sulphate.

As usual, dollar-spot was much more active on putting greens which were somewhat over-fertilized, especially if sulphate of ammonia had been used. If the putting greens soil contained sufficient lime, the use of sulphate of ammonia had no more effect on dollar-spot than other fertilizers. During the humid periods following the Eastern storms it seemed impossible to check dollar-spot on some courses. In these cases it was usually discovered that the putting green soil was quite acid. In some cases an application of lime was effective and the plants became more vigorous and resistant to further attacks of dollar-spot. Also the grass would respond to fertilizer and the diseased spots would heal over more quickly. When lime is indicated it is best to use hydrated lime,

since it is more active than the ground limestone and hence gives quicker results. Great care however must be exercised in using hydrated lime in the summer when bad burns might be fatal to the turf.

Hydrated lime should not be applied within a week of sulphate of ammonia and vice-versa. To relieve acid condition in greens as an emergency in the summer the hydrated lime should be applied at the rate of 15 pounds to 1,000 sq. ft. It is best to apply lime mixed with soil or sand and to spike the greens lightly following the application in order to aid the lime to reach the roots. Before applying lime to all greens on the course greenkeepers should try lime on a corner of one green or more to ascertain its effectiveness. If an emergency application of lime is effective in the summer the greens should receive a heavy application, 45 lbs. to the 1,000 sq. ft., during the following winter.

### Over-fertilizing.

As usual, over-fertilized putting greens made up a considerable portion of the summer turf injury. This was particularly true on *Poa annua* putting greens. Rank, lush turf caused by applications of nitrogenous fertilizers apparently is too tender for certain summer conditions. Fine, soft, dark-colored grass may be maintained when the weather is dry and hot, but if heavy rainfalls which keep the soil saturated for several days occur during hot weather much over-fertilized grass is bound to be lost by disease or other causes.

Greenkeepers dread to prepare for tournaments in hot weather. If the grass on greens can be left to grow slowly and naturally during the summer, possible injuries are greatly restricted and the turf is in a condition to make a quick recovery. Turf allowed to go naturally through the summer will become faded in color, harder and thinner in texture and faster for putting. Golfers should be taught to realize that it is better to sacrifice something in the appearance of the greens for a couple of months rather than to have greens as perfect in appearance and feel as in the spring or fall one week, and eaten up with disease and covered with dead or dying areas the next. The putting turf on some courses was unwittingly stimulated this summer as in previous summers. Greenkeepers forget that bulky organic materials can supply large amounts of nitrogen to the greens when the comparatively large quantities applied are con-



Proper use of preventives would probably have prevented the brown-patch attack which has ruined this green.

sidered. For example, a compost may be made up for topdressing greens which contains  $\frac{1}{2}$  well rotted manure. A yard of this compost contains approximately 650 lbs. of the manure. Well-rotted manure will probably analyze 1 per cent nitrogen, and therefore  $6\frac{1}{2}$  lbs. of nitrogen, or as much as is contained in  $32\frac{1}{2}$  lbs. of sulphate of ammonia, is put onto the greens at each application. Perhaps two or more such topdressings are made before hot weather.

No such results are obtained with these applications as would be obtained from a  $32\frac{1}{2}$  lb. application of sulphate of ammonia, since the nitrogen in manure is mostly slowly available. The availability of nitrogen in such organic materials depends upon bacterial action which in turn is stimulated by a combination of heat and moisture. The trouble therefore comes when great bacterial activity occurs in hot humid periods in the summer and the nitrogen thus released causes a sudden rank growth of grass when least desired. Greenkeepers who have had experience with this type of injury are now using manure in topdressing only for fall and early spring applications. Should the greens require subsequent topdressing the organic matter in the topdressing is supplied with peat.

Putting greens may run short of various mineral elements if less and less manure is used and more and more sulphate of ammonia. So to meet this gradual change in greenkeeping practice it is customary nowadays to make sure that the greens get sufficient minerals, particularly phosphorus and potash, by applying a complete mixed fertilizer in the spring and

fall. The remaining fertilizing of the year can be confined to occasional light applications of sulphate of ammonia as needed. As mentioned above, lime can be applied in the winter when calcium is needed. Most soils contain sufficient of the various other elements the grass plants use.

#### Effects of Poor Drainage.

After the storms in the East this summer it was quite easy to pick out the poorly drained greens. These greens were worst hit with diseases such as brown-patch, dollar-spot, and pythium. There was also considerable injured turf on poorly drained areas apart from the effects of fungus diseases. *Poa annua* was the first grass to disappear from the effects of poor drainage. In many cases the turf in low areas in greens was entirely drowned and failed to recover. It was found in poorly drained areas that the soil had remained saturated for days at a time and that the roots had died. After the turf had become thin it was usual for a heavy growth of algae to complete the injury. It was found that light applications of bichloride of mercury effectually held algae in check.

A great deal of secondary injury followed these hot wet spells. Apparently in some cases the grass continued to live with little or no root system so long as the soil retained sufficient moisture at the surface. In a good many cases greenkeepers felt that the soil contained enough water and failed to watch the greens closely. Symptoms of the need of water shown by the grass passed unnoticed and the grass died. Greenkeepers can recognize the peculiar metallic or lack-lustre shade that grass takes on before wilting. They know the danger of the darkened blades

and the failure of the blades to recover their erectness after being trampled. When these symptoms occur grass needs water and if this need seems unnatural perhaps an examination of the root system will explain. The grass on some putting greens showed these symptoms even though the soil had dried only to a depth of a little over one-quarter of an inch. An examination of the root system of this grass showed that the roots were practically dead and had ceased to function. Greenkeepers should realize that grass roots will not survive lack of oxygen (induced by saturated soil conditions) in hot weather and should examine the grass roots at certain times to ascertain their condition. If the root system is shallow, withered and brown, or if the feeding roots have died, the grass will probably depend mostly on surface water until it grows new roots, and hence it may be necessary to water frequently even though the cause of this condition was too much water.

Most of the trouble from too much water can be eliminated by proper drainage and soil structure. Topsoil should be of a sandy loam nature and should contain ample organic matter. Such a soil will hold well-played shots when dry and will absorb plenty of moisture to a good depth when watered. The greens should have proper surface drainage, and it is more important still that they have adequate underdrainage. With good tile underdrainage in a putting green the watering problem becomes much simplified. When the underdrainage functions, free water will not remain in the soil long enough to affect the roots adversely.

The usual amount of turf around the high edges of the greens was damaged this summer. The direct cause of this brown and dead turf on the edges of the greens is lack of water. The indirect cause is poor construction and maintenance. In constructing a putting green the builder often economizes on soil and does not carry the slopes sufficiently away from the green, with the result that the turf at the edge of the green dries rapidly. The slopes on and away from the greens should be very gentle. If a high mound on one corner of the green is desired the putting surface should slope up to it very gradually and the same long slope away from the green should be built. Frequently little if any good topsoil is put at the edges of the green or if so, the layer is too thin. In other cases where there are steep

grades the good soil has washed towards the lower portions of the green. From lack of soil containing enough sand and organic matter, the edges become packed and the soil so firm that water runs off. So little water is absorbed on these high edges with ordinary watering of greens that they become too dry and the grass dies. This condition can be improved without rebuilding the green by spiking the hard dry edges and by working a soil high in organic matter and sand into the spike holes. This treatment followed by gentle hand to the soil through the hard surface crust. This treatment followed by gentle hand watering to allow the water to be absorbed will do much to prevent the unsightly loss of turf each summer from edges of putting greens.

### Insects.

There was considerable injury to putting turf throughout the country from various species of cutworms. There was, however, no need for appreciable injury from this source. When cutworm injury was bad on greens either the greenkeeper had been negligent or did not know how to control this pest. In spite of the large amount of cutworm and sod webworm injury in 1930 when hundreds of greenkeepers learned how to control these pests, there are still greenkeepers who do not understand the difference between controlling white grubs and cutworms. In the case of white grubs, Japanese beetle grubs and earthworms, the grubs or worms eat the soil and the poison must be in the soil to be effective. Cutworms and sod webworms, however, do not eat the soil but feed on the blades of the grass, particularly the lower and tender part of the blades, and therefore the poison should be left on the blades and not washed off and into the soil. Lead arsenate is most useful and economical for the control of both these types of pests. In treating to poison cutworms, lead arsenate should be applied 1 lb. to 1,000 sq. ft. It is best applied by mixing it in just enough water to cover the green evenly and spraying it on the turf. The spray tank should be kept agitated while the arsenate is being applied to keep the chemical in solution.

### Repairing Injured Greens.

When turf is lost from putting greens in the summer it is always a great problem to get it back quickly. *Poa annua* will return with the cooler weather in the fall from the many seeds the plants have de-



posited in the soil. It is however an excellent idea to get areas of dead *Poa annua* replanted with bent so that the same trouble is not so likely to re-occur.

When dead areas are found in greens, whether from *Poa annua* or various varieties of bent, the greenkeeper must repair the damage as quickly as possible. If a sod nursery has been maintained, the injured grass can be quickly resodded and the green will soon be in shape again. If there is no sod nursery and sodding is desirable a possible method is to cut the sod from the side and back edges of the green to repair spots towards the center of the green; the bare areas left at the edges can then be replanted, and since they are far from the cup they will cause little concern to the players.

When areas are to be replanted, it is extremely difficult to get even a fair catch during the hot summer weather. The young plants from seed can not stand the heat and soon curl up and die. There is more chance of getting bare patches filled during the summer from plantings of stolon bent than seed. The stolons should be slit into the bare areas and covered with light topdressings. A little bent seed can be sown with the stolons and if it lives, so much the better, but in any case the stolons will usually catch and gradually cover over the area. Needless to say the stolons should be planted closely together for quick coverage. But in any case replanted areas are slow to form turf, are unsightly and offer a poor putting surface, so that no greenkeeper should be without at least a small turf nursery.

### Caring for Fairways.

Golf course economy is probably affecting the fairways on golf courses more than other parts of the course. As a matter of fact the rough, traps, tees (except on one-shot holes) and to a certain extent even putting greens should be neglected before the fairways. There are too many golf clubs around the country that, in spite of fine clubhouses, furnishings, swimming pools, etc., play winter rules on the fairways during the summer. Many clubs excuse themselves by saying that they intend to install fairway water systems, and are not spending any money on the fairways in the meantime. It is admitted that water helps to a great extent and many golf courses throughout the West would have given a lot for water on their fairways this summer. However if the fairways have a solid deep turf during the

spring and fall it is not a great hardship to play on such turf even if it is brown and dry for an occasional summer month. When there is a good turf the lies are still good even though the grass is brown. Healthy fairways always come back quickly after a drought. There is seldom a soil so rich that good fairways may be maintained from year to year without fertilizer.

The fall is the best time to fertilize and when fertilizing is done it should not be skimped. A double rate, that is, two full rate applications applied during the early fall in one season, will fill in the turf and give much more permanent fairway improvement than the same amount of fertilizer applied in two years.

The clubs that are waiting for fairway water systems and meanwhile letting their fairways go to pieces will perhaps be surprised to learn that they will have to fertilize more heavily with water than without. Grass is not made up entirely of water and plant food cannot be taken from the soil forever without returning it. Watered grass grows faster and depletes the soil of plant food quicker than unwatered grass. Watered fairways without annual fertilizing soon fill in with clover, annual grasses, and weeds.

The Green Section *Bulletin* of November, 1931, published the results of extensive work on the effect of height of cut on bluegrass fairways. The results showed conclusively that the bluegrass had a much better root development, that it filled in thin spots more quickly and made a denser and more drought-resistant turf under high cut conditions.

Although the ideal height of cut is higher than present day golfers will allow, the custom of cutting fairway turf at  $\frac{3}{4}$  in. or less should be abandoned. If fairway turf is cut at  $1\frac{1}{4}$  to  $1\frac{1}{2}$  ins. the turf will become denser and the lies will be much better than on closely cut but thin turf. Sometimes greenkeepers cut fairway turf very close so that they will not have to cut so often. By cutting very close the stems are injured and hence the growth is set back. Nowadays it is possible to get fairway mowing equipment that will cut the fairways easily in a day. Golf clubs should supply the greenkeeper with adequate equipment and insist that the mowers be set for a sufficiently high cut even though the fairways may have to be cut every other day at certain times.