

after time the estimated depth of a producing well has turned out to be far short of the actual depth and the deeper the contractors have to bore the higher the cost of the operation.

On the average 18-hole golf course the maximum amount of water for the watering of tees, greens and fairways should be approximately three hundred gallons per minute. On properties where there are creeks or springs it is easy to determine how much water is available by using a weir and thus calculating the flow exactly.

If the flow is less than 300 gallons per minute it is then necessary to build a reservoir and impound sufficient gallonage to take care of the stated maximum. But a reservoir, even counting the cost of the dam, pump and piping, is cheaper in the long run than drilling wells or buying from a private water company.

Finally one of the most important points in selecting a golf property is to secure a self-contained acreage without interrupting public highways.

Nothing tends to detract from the pleasure of the game more than the necessity of having to cross a highway, particularly where there is a constant flow of traffic, even though the crossing is between green and tee and not in the actual play.

Instances may be cited where this or that well known club with its so called championship layout has roads that must be crossed in the course of a round. Yes, but why perpetuate an error?

The Most Important Summer Work on the Golf Course

By R. A. Oakley and O. B. Fitts

As the responsibility for the upkeep of a golf course usually rests on the shoulders of both the chairman of the green committee and the greenkeeper it is very important that these men should understand each other and that they should both familiarize themselves with all the phases of the work involved in golf course maintenance to the extent that they appreciate the relative importance of the various phases of the work to be done at different times of the year.

Next it is important that the greenkeeper be supplied with sufficient labor and equipment to carry on the work properly and that he has his force so organized that the important jobs can be given the attention they need at the proper time.

During most of the active playing season the greens require more careful and constant care than any other part of the course, or, in fact, all other parts of the course combined. For courses having essentially the same conditions as those obtaining in the general latitude of Washington, and this means most of the northern courses, the summer is the time of the year when greens must not be neglected. Fairways or rough or bunkers may be slighted if it is actually necessary to slight them, and usually they will not show the evidence of neglect for any considerable length of time after good treatment is renewed; but neglect of the greens is not as easily corrected.

It is rarely the case nowadays that a club is over-supplied with labor. Competent laborers are far from plentiful. Therefore the problem is to use the available ones where they will do the most good. It too frequently happens that groups of men are put at work cutting

weeds in unimportant places or making repairs here and there—in short, polishing up the course—when every available man should be pulling crab grass out of the greens or treating the greens with chemicals for the prevention or cure of brown-patch, or some other important piece of work that, if neglected, is apt to result in inestimable damage to the greens and loss of time and money later. This is poor management indeed.

It is scarcely possible to pick out one piece of work as being of the greatest importance, but nearly all will agree that there is a group of things that should be done in the summer even to the neglect of all other work on the course.

In most parts of the North the greens are the first daily consideration at this time of the year. The order of importance of the work that should be done on them is about as follows: Mowing, watering, weeding (particularly removing crab grass), topdressing with good compost when needed, and applying chemicals to prevent or check the brown-patch disease when this is necessary. If these things are done properly and when they should be done there will, as a rule, be time enough to care for the fairways and the rough.

Mowing.—While there is much difference of opinion regarding the height at which putting greens should be cut during the summer months, particularly in hot weather, the game requires that they be kept with an even surface. This virtually means cutting every day. To those who have observed greens closely in this latitude it is clearly evident that if the best possible turf is to be maintained they must not only be cut practically every day but they must be cut closely. This applies especially to vegetatively planted bent greens. A considerable period of observation and study has resulted in this conclusion. Cut bent greens every day during the summer and cut them closely, removing the clippings. See that the mower is well adjusted at all times.

Watering.—As in the case of mowing, there are differences of opinion with regard to watering. Some—in fact, many—contend that greens should not be watered during periods of hot, bright sunshine. It is very doubtful if there is any real evidence in support of this contention. Summer showers frequently occur on hot days and are followed by bright sunshine. This is the rule rather than the exception.

During the past four or five years the United States Golf Association Green Section, in cooperation with the Department of Agriculture, has conducted a number of experiments in the time of applying water and the rate of its application, and from the results of these experiments to date we have seen no indication that watering during midday is injurious to turf in the least. Taking these experiments and experience into account, the matter of watering shapes up about as follows: Water the greens when they need it, preferably early in the morning when it can be done without interfering with play, otherwise water when the work will be of least inconvenience to the players, but in any event water the putting greens liberally and let the appearance of the turf be your guide as to when to water and the quantity of water to apply.

As far as the relation of watering the greens to the brown-patch disease is concerned, no evidence has been produced that turf which

receives proper watering is any more susceptible to brown-patch than turf which is neglected in this respect. On the other hand, there has been evidence that early morning watering has a tendency to lessen the injury from an attack of large brown-patch, and it is for this reason that watering early in the morning was suggested above. Watering the greens apparently has no relation whatever to the small brown-patch.

Weeding.—Outside of controlling weeds by the use of fertilizers, there is only one satisfactory way so far known for keeping them out of putting greens. That way is hand-weeding. The important weed to fight in the latitude of Washington at this time is crab grass. Do not waste time cutting or pulling weeds out of the fairway, the rough, or the bunkers when crab grass is in evidence on the greens. Do not let anyone tell you that the time to eradicate crab grass is after it has started to branch. The time to pick crab grass is when it first becomes evident, and it becomes evident when it is in the very early seedling stage. One man can remove more crab grass plants in this stage than can three men after the plants have started to branch. Water the greens just before starting to pick crab grass. The young plants pull out more easily when the ground is wet than when it is hard. If you have anything like a full gang of men on your course, do not listen to the contention that if the crab grass plants are allowed to grow to a good size they can be removed by means of a special rake. True, you can get a lot of them this way and with relatively little labor, but there is a very great percentage that you can not remove; and besides, the severe raking necessary to get even a fair percentage of the crab grass plants proves detrimental to the turf grasses in this vicinity. It will probably do so elsewhere. Crab grass has ruined more greens in this latitude than all other weeds combined, and it has done so largely because it has not been removed in the early stages of its growth. Get the crab grass while it is in the harmless stage. It will not remain in this stage long.

Weeds may be controlled to a great extent by consistent fertilization with such acid-reacting fertilizers as ammonium sulfate or ammonium phosphate. In the experimental turf plots at Arlington where a series of plots have been treated with various fertilizers once a month during the growing season since 1921 there has been very striking evidence of the tendency of acid-reacting fertilizers toward keeping the turf free from crab grass, clover, and numerous other weeds, as well as showing a tendency to discourage earthworms.

Topdressing.—For the production and maintenance of fine turf, good compost evenly applied as a topdressing is a prime necessity. It looks as though the application of good compost comes in a class with mowing and watering in the summer treatment of putting greens. Heavy applications at this time are rarely desirable, but frequent light applications of a cubic yard or less per 5,000 square feet help the turf wonderfully throughout the summer months. The benefits from the use of compost as a topdressing are very generally recognized, but there are too few that appreciate the advantages of topdressing greens during the summer. A good compost may be made from one-third clay loam, one-third well-decomposed manure

or mushroom soil, and one-third sand. These ingredients should be thoroughly mixed and well screened. If compost as good as this is not available, use the best that materials at hand will afford. To compost may well be added some sulfate of ammonia, approximately $1\frac{1}{2}$ to 2 pounds per 1,000 square feet of turf for summer treatment, or about double this quantity for spring and fall applications. Top-dressing with compost gives the grass a new lease on life, and besides it seems to be an exceedingly helpful treatment in the relief of brown-patch.

Treating the greens with chemicals to prevent or check brown-patch.—During the summer months, in the latitude of Washington and St. Louis as well as in numerous other regions north of this latitude, putting greens are apt to be attacked by the brown-patch disease of turf, which, if neglected, may in a very short time practically destroy a beautiful putting green. In regions where the greens are subject to frequent attacks of brown-patch during the summer season it is advisable to use precautionary measures, as well as to be on the constant lookout for the appearance of the disease and prepared to combat it at its first appearance.

A simple treatment which has recently been found to be very effective in the control of this disease is the application of calomel (mercurous chloride), using one-fifth of a pound to treat 1,000 square feet of green. This may be applied in the form of a spray or it may be used mixed with a small quantity of finely screened soil or sand. In either case it should be uniformly distributed over the surface of the green and then thoroughly watered in. It may be necessary to repeat this treatment several times during the season in order to obtain complete control of the disease, but even so it is a very practical treatment. In case calomel is to be used as a spray, it is important that the spraying apparatus be equipped with an agitator in order to keep the material in suspension in the water at all times, as the calomel will not dissolve. Fifty to 75 gallons of water is sufficient for any ordinary putting green, and the quantity of calomel necessary at the rate suggested above should be weighed and placed in a barrel or tank while it is being filled with water. Then the agitator should be allowed to work for a sufficient length of time to get the calomel thoroughly distributed in the tank before the nozzles are opened.

There are a great many things that must be done on the golf course during the summer in addition to the ones mentioned here. Fairways must be mowed, the rough must be cut occasionally, bunkers must be raked and mowed, and other things almost without end; but do not forget that the greens are passing through the critical time of the year, and for them the important items of treatment and care must not be neglected.

A Green Section meeting will be held in Washington on Monday, August 29. Visitors will be guests of the Green Section for the day. Headquarters will be at the Hotel Hamilton, 14th and K Sts., N. W. To complete the program as scheduled it will be necessary to leave the hotel for Arlington promptly at 9 a. m. Be sure to tell us that you are coming.