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A MONTHLY PERIODICAL TO PROMOTE THE BETTERMENT OF GOLF COURSES

CONTENTS.

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The Error of Generalizing

It seems to be a habit of the human mind to generalize. Even this in a way is a generalization. Man makes a few observations, then a few correlations, and then concludes at once that he has discovered a law. The philosopher is eternally blanketing all individuals and races under specific attributes. The Psalmist reflects, "I said in my haste, 'All men are liars.'" And the wag logician suggests that if all men are liars then the Psalmist must be a liar, and therefore all men are not liars. Philosophers and poet philosophers may be forgiven for their willy-nilly indulgence in generalities. They do little harm. "All flesh is grass" is a beautiful conception, and as a matter of fact is not far from the technical truth, but when generalizing is taken into the realm of natural sciences—specifically biology, or the science of living things—it becomes a bad habit.

In plant culture we meet with generalities every day, such for example as "plants will not grow in water-logged soils" and "soils must be aerated to produce the best growth of plants." Yet we know that rice and cypress trees grow in swamps and that these soils are not aerated in the commonly accepted sense of the term. It is true many plants require well-drained soils for their best growth; but all plants do not—some plants will not even live in them. "Plants thrive best in a sweet soil," say many would-be teachers. True enough, red clover and alfalfa do. But how about blueberries and rhododendrons?

Generalizing has invaded our own pet field—turf culture. Because turf lives indefinitely we have generalized that the grass that makes it is a true perennial, such as is an oak tree or an alfalfa plant, and have predicated our methods of culture upon this erroneous conclusion. Nothing is more fallacious than the all-too-commonly accepted view that once the roots of the grass become established deeply in the soil the success of the turf is assured. It has resulted in extravagant waste of money and much bitter disappointment.

A meadow and a putting green are distinctly different in their fertilizer requirements, but they have commonly been classed together in this respect. In the case of the latter, not only growth of grass but texture of turf and freedom from weeds must be considered.

Lime is still regarded by many as the panacea for soil and plant troubles, but we know that in the culture of the bents and fescues, at least, it has little or no place. "Greens should be rolled frequently," says one. "They should be rolled only occasionally," says another. One generalizes from sandy soils; the other from clay. Close cutting of greens is advised by one as necessary for good turf. It is condemned by another as harmful to the grass. One has bent grass in mind, the other fescue. Both would be right if each would name his grass, or, in other words, if they would be specific, but failing to be specific, both are wrong. And thus we find it throughout greenkeeping. What is sauce for the goose is not necessarily sauce for the gander, particularly if the male bird be of a different species.

Generalizations to which there are important exceptions can not be excused on the ground that the exceptions prove the rule; for just as this expression, as at present worded, is a perversion of the original meaning, so is its present meaning a perversion of the truth. Rules are laws, and laws are facts immutable. If we must generalize let us be careful to note the exceptions, if any, or at least to indicate their existence. We

should practice the habit of scientific thinking, which avoids generalities, except as they come through the proper steps of hypothesis, theory, and finally law. We should understand that reasoning by analogy does not necessarily end with license to generalize. Furthermore, we should practice the strict definition and use of terms. Where possible, relative terms should be avoided. Too frequently they confuse rather than enlighten. If we do not have exact expressions to convey our thoughts we should start at once to develop them so that those who hear or read our words of wisdom may know just what we mean.

Early Morning Watering As An Aid to Brown-Patch Control

By O. B. Fitts

There is much to be said on the subject of watering putting greens. There is investigational work still to be conducted before the practice of watering can be put on a thoroughly sound basis. But what it is desired to do at this time is only to offer some suggestions regarding the relation of watering to the control of brown-patch. By brown-patch, in this article, is meant specifically the large brown-patch. The suggestions here made may also apply to the control of the small brown-patch, but the evidence accumulated is not so definite on this point.

In 1923 experiments were conducted at Arlington Farm on the effect of early morning watering on the control of brown-patch. While the experiments are still in progress it can scarcely be said that they are of sufficiently long duration or sufficiently extensive to do more than offer a hopeful suggestion. To be brief and to the point, the results at Arlington and on the greens of the East Potomac Park Public Golf Course, Washington, indicate that, in the latitude of Washington, D. C., watering in the morning before 7:30 o'clock is very helpful in the control of the large brown-patch. It does not prevent the disease, but it seems to lessen its effect appreciably, so that recovery after an attack is relatively rapid when the usual good treatment is given.

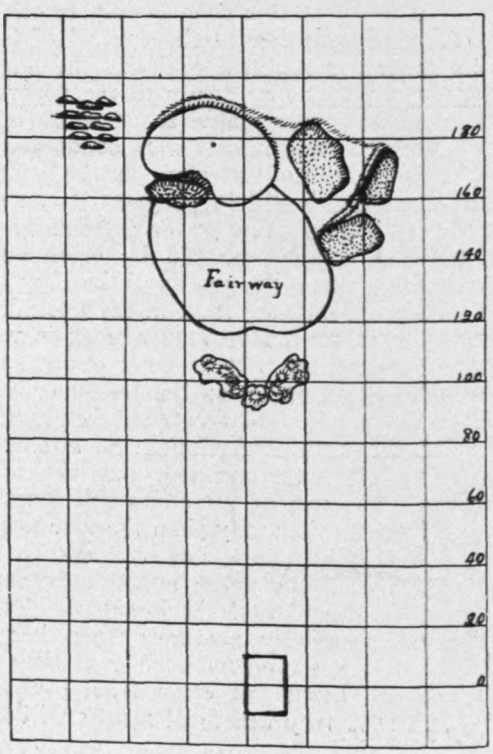
In the tests at Arlington no attempt has been made to measure the quantity of water applied, but the application may be regarded as liberal. The use of an adjustable nozzle, which will give considerably more force to the spray than the rose nozzle, is regarded as more effective. Care should be taken, however, not to apply sufficient force to disturb the surface of the green appreciably or wash the soil from around the crowns of the plants. It is suggested that this method of watering be followed, especially at times when brown-patch is likely to be active. While it is not recommended as a sure means of control under all conditions, no harm can come from giving it a thorough test, and it is thought that very beneficial results will follow.

New Member Clubs of the Green Section.—Ottawa Country Club, Ottawa, Ill.; Petersham Country Club, Petersham, Mass.; Blue Hill Country Club, Orangeburg, N. Y.; Albany Country Club, Albany, N. Y.; Berkeley Country Club, Berkeley, Calif.; Clinton Country Club, Lock Haven, Pa.; Country Club of Ithaca, Ithaca, N. Y.

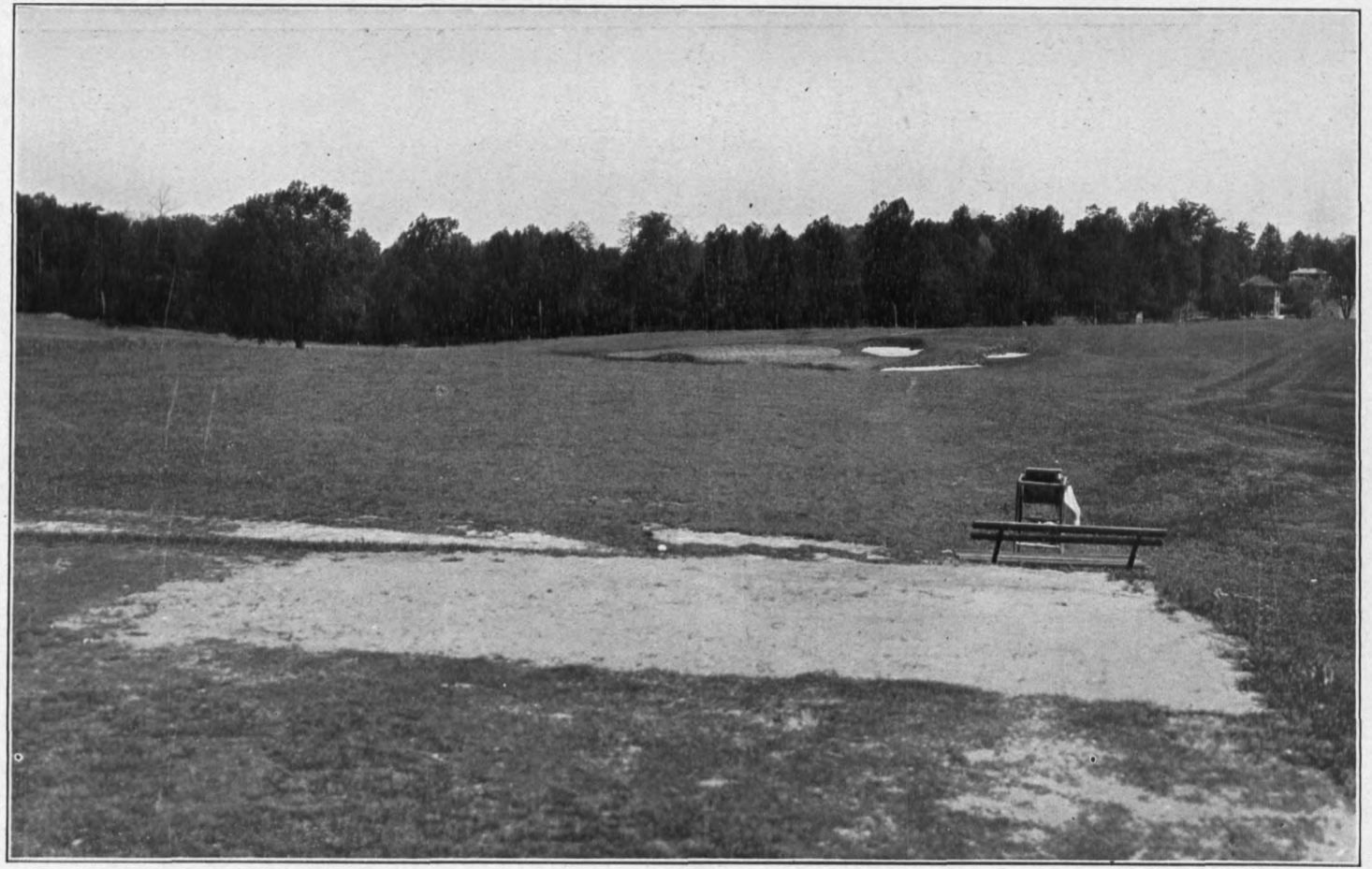
Replacing Fly- or Cylinder-Knives.—A new 14-inch golf-green mower with a grass-catcher costs somewhere around $38, and it does not require any element of skill other than such as an ordinary ingenious farmer has, to put new knives in the machine. Last year we bought cylinder-knives complete for three of our old machines for about $16 each and replaced the bed-knife with a new one, which puts the machine in first-class condition. In the past the trouble has been that when the cylinder-knife wore down the machine could not be set to cut close, and as far as we can find it has been the practice to discard the machine and buy a new one; at least that is what we were doing for nine years.—*W. R. Hurd, 2d, United Shoe Machinery Athletic Association, Beverly, Mass.*

Instructive Golf Holes X

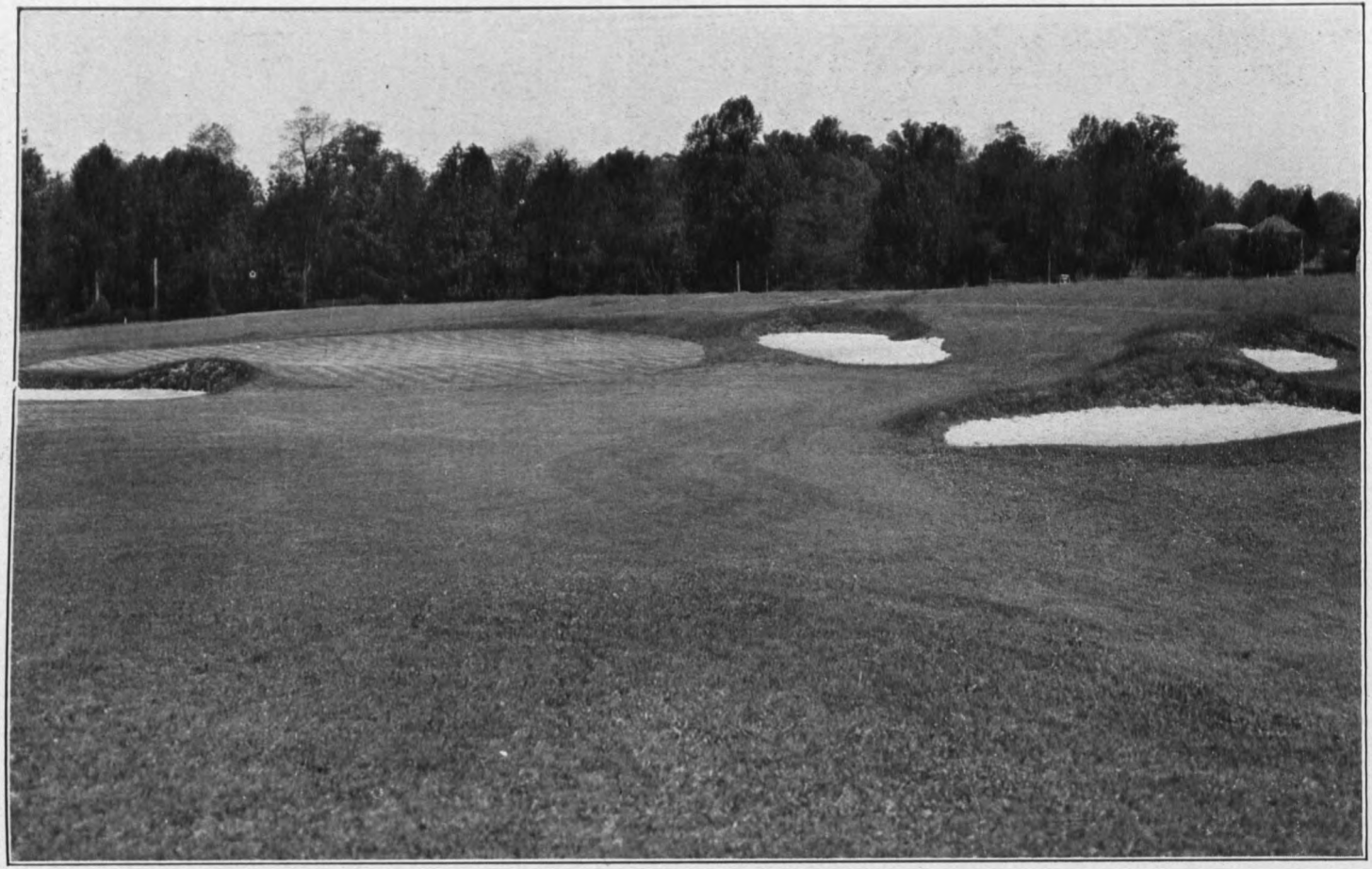
No. 8, Columbia Country Club, Washington, D. C.



This hole is situated on gently rolling land, the green being on a slightly lower level than the tee. Indeed, the latter is built up to secure full visibility, as the ground from the tee midway to the green is nearly level but very slightly upgrade. The approach to the green is narrow, heavily guarded by bunkers on the right, and with a bunker as well as a vertical bank on the left. The green is bean-shaped and slopes from the right to the left and from the back to the front, being lowest at the extreme left. In other words, the slope is something like that of half a saucer. Its area is about 6,000 square feet. A perfectly driven ball rolls on the green at the right and then describes an approximate semicircle, coming to rest near the center. It thus requires an accurate and delicately judged ball to reach and hold the green. An over-strong shot is in the rough beyond the green, making the second shot more difficult, if anything, than one from the fairway in front of the green. This hole represents a very attractive type. Its length may be varied from 176 yards to 199 yards.



Hole No. 8, Columbia Country Club. View from Tee.



Hole No. 8, Columbia Country Club. Close-up View of Putting Green.

Bent Stolons Two Years Old as Compared With Those One Year Old in Vegetative Planting

A Contribution from a Green-Committee Chairman in the East

In connection with the vegetative planting of creeping bent stolons, the question is often asked as to whether stolons of two years' growth are as satisfactory as those of one year's growth.

From my observations I am led to believe that stolons of the first year's growth will show much quicker and probably better results than older ones. A club which has had considerable experience with vegetative planting put out a nursery bed the first part of May, and by October of the same year had obtained sufficient growth of stolons to plant six greens, the stolons having attained an average growth of approximately four feet. Here was a case of greens being planted with stolons five or six months old, and with exceedingly satisfactory results. The grass came up remarkably quickly and showed a decided tendency to spread and take root wherever there was a chance.

In the following year two other greens were planted from the same nursery bed, the stolons being practically one year older. These two greens developed very fine turf, but the growth in the greens was much more slow and required much more encouragement than the growth from the same nursery planted the previous fall.

It is of course appreciated that different results might have been obtained by a different strain of creeping bent, inasmuch as it is known that these strains differ in many respects.

By this it must not be understood that old stolons are without value. The same club uses their old stolons for tees and repair work, and with good results. When it comes to planting a green, however, it is believed that much more rapid results are obtained from stolons not over one year old.

Quick Sodding at the Country Club of Atlantic City

By H. Kendall Read

In the reconstruction program of the Country Club of Atlantic City, we faced the problem this spring of sodding 7 greens (several of which were fairly large in size) and 12 new tees and the enlarging of a number of old ones. We also had to sod the approach areas immediately in front of several of these new greens, as well as portions of the fairways where traps had existed. This seemed like a real job, and it raised the important question as to the most economical and efficient method to pursue. Being familiar with the experimental work carried on at Washington by the Green Section, I determined to cut our sod thin. We set the blade on our sod-cutter at a scant 1¼ inches; after making allowance for the height of the grass, this gave us less than 1 inch of soil.

This work entailed lifting the tops off of 7 old greens. The job was so big that we had to make time. We therefore hitched a single horse to our sod-cutter and drove right over the greens, not even using horse-boots, disregarding the slight damage to the turf by the horses' hoofs, which we were confident would disappear in the top-dressing. Cutting the sod so thin enabled us to roll it in strips four or five feet long, without a particle of damage. It will be readily seen that in this way a single wagon could carry in one load about double the quantity of sod that it

could carry if the sod were cut thick. This also saved time and expense.

We were very careful in preparing the surface before laying the sod. We gave the surface plenty of rolling, and had a good, firm top. When it came to placing the sod, we lost no time. In the beginning we were a little too particular. In sodding the first green, the men got down on their knees, fingering each sod and shoving a little dirt underneath here and there. I tried to make the men understand the waste of time in this procedure, and laid sod myself to illustrate what I meant. We then kept speeding it up, faster and faster, and at the end it was an easy matter to do the biggest green we had inside of a day. If your surface is properly prepared (and this is most important), it will be a waste of time to devote much attention to laying the sod. If the sod is properly cut, the men do not even have to stoop in placing it, but may use pointed forks, and their feet, for this purpose.

If the proof of the pudding is in the eating, then I am sure we were justified in our methods. These greens have come up beautifully, and in a very short time will be equal to any of the old greens on the course. The sod knitted very rapidly, and frequent top-dressings soon brought the greens to a good putting surface.

This experiment has been most valuable, and we have certainly learned how to sod in a hurry, save expense, and at the same time get results.

Compost shed at Yorktown (Virginia) Country Club. This shed is 100 feet long and about 25 feet wide. The club used in the neighborhood of 300 yards of compost for the first top-dressing on the fairways.

Injector Nozzles for Use With Carbon Disulfid in Ant Extermination.—"On page 126 of the May number of THE BULLETIN, under Question 4, relating to exterminating ants in putting greens, I note that in your answer you recommend the use of carbon disulfid injected into the ant hole. I note also that one of your correspondents has suggested the use of a rubber bulb syringe with a rubber nozzle. It occurred to me that you might be interested in my experience with hard rubber injectors of this type. Several years ago, in connection with a series of experiments being carried on by the New Hampshire Experiment Station, we had occasion to use hard rubber injectors in connection with carbon disulfid, and found that after using the injector with carbon disulfid for a short time the material softened the hard rubber and made this type of injector decidedly unsatisfactory for the purpose. We then used a brass injector, such as is used for injecting heavy automobile oil into transmissions, and found this to be a very effective instrument. It is possible that the carbon disulfid might not have quite the same effect on soft rubber injectors, but our experience certainly showed that it had a very bad effect on the hard rubber type of injector."—*C. H. Hadley, Director, Bureau of Plant Industry, Harrisburg, Pa.*

Treatment of Nursery Rows of Creeping Bent That Produce Seed Stalks

By R. A. Oakley

Many reports have been received recently to the effect that creeping bent in nursery rows is sending up seed stalks. This condition seems to be more or less common in nurseries planted last fall as well as in nurseries planted in the spring of 1923.

The seed habits of creeping bent are not thoroughly understood. Seasonal conditions seem to exert a very marked influence on them, and cultural methods also seem to exert some influence. Apparently it is not known just what is the normal course of development in creeping bent in the matter of producing seed. This point should be studied carefully, as it is likely to prove of considerable importance in relation to vegetative planting. But just at this time there is a practical situation to meet. What treatment should be given a nursery to bring about the best growth of stolons in case of the formation of seed stalks? There are few data upon which to base recommendations. At Arlington, in the summer of 1923, nursery rows of the "Acme" strain of velvet bent planted with fresh stolons the previous September produced seed stalks abundantly. With a view to getting information on the treatment that should be given nursery rows in this condition, the seed stalks were cut on part of the rows when the heads or panicles were well formed. On the remaining part the seed stalks were allowed to grow to maturity. The part of the rows from which the seed stalks were cut early produced a much better growth of stolons than the part left uncut. This, of course, is only one piece of experience, and that with velvet bent, but it is backed by the general principles of plant culture, and if cutting the stalks is beneficial in the case of velvet bent it is likely to be beneficial in the case of creeping bent. Surely no harm can be done by cutting the stalks high enough to avoid cutting the stolons. This may be done with a scythe or sickle, or, in the case of a large nursery, with a side-bar mower.

As has been indicated, there is much still to learn regarding the life history of creeping bent—that is, just what is its normal behavior from the time the runners are planted to the time the original plants produced from them pass out of existence through old age. Some grasses produce two kinds of stems, one that makes heads normally and one that does not make heads normally. Timothy is such a grass. But in timothy it is known that certain methods of culture tend to increase the proportion of stems that produce seed heads, while on the other hand certain other methods tend to discourage seed production, or to produce an abnormally large proportion of stems without heads. They may do so in creeping bent planted in nursery rows. This is merely a suggestion that may be taken for what it is worth. One thing is sure. Seed stalks are of little, if any, value for planting of greens. While presumably they will do no harm if mixed with the stolons at the time of planting they can not be counted upon to do any good. Furthermore, while they are developing in the nursery rows the growth of the stolons seems to be at a standstill. This is really the important feature to be considered.

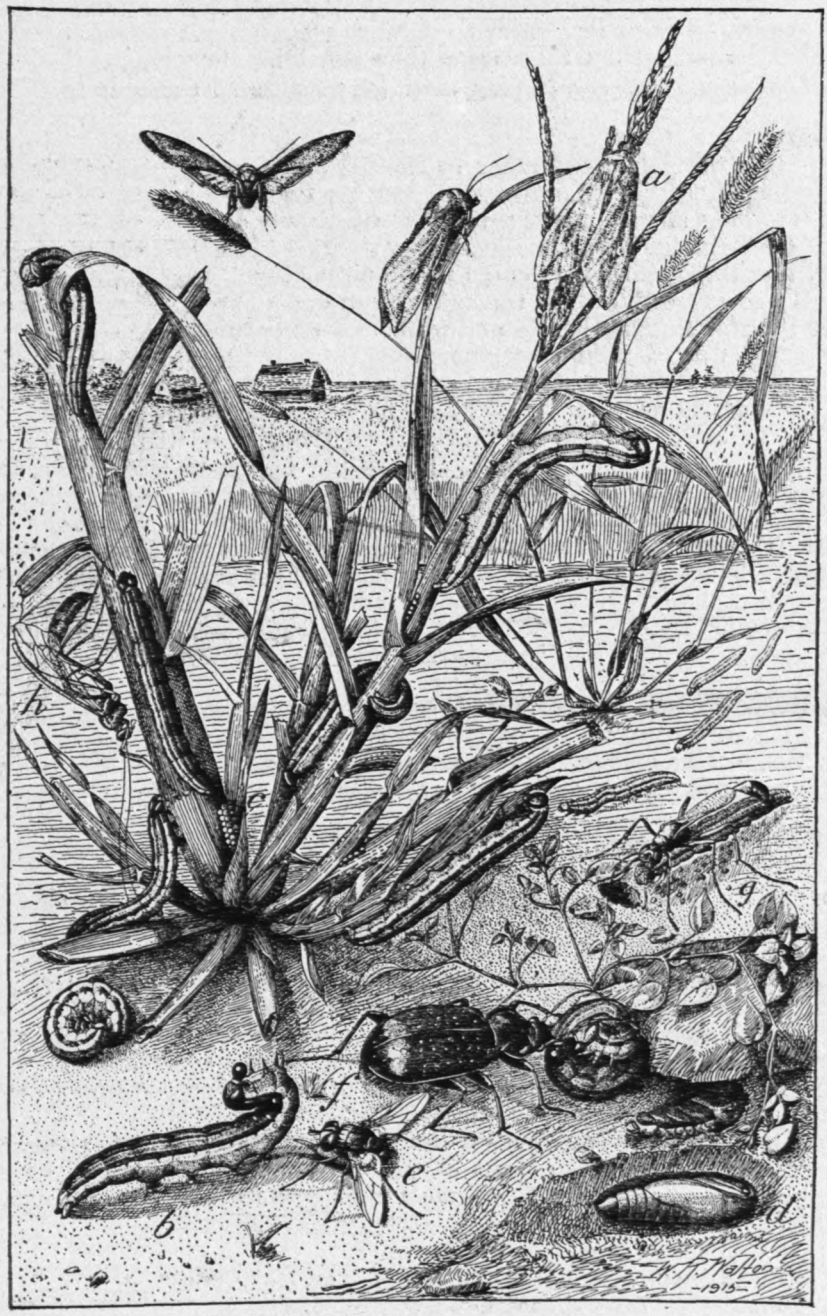
Damage to Turf from the Army Worm

A report has been received from the Ottawa (Illinois) Country Club indicating the spread of the army worm on their course. As there is at the present time an outbreak of the army worm in Illinois, occasioning damage to lawns, it is doubtless to the interest of golf-clubs to be on the lookout for the presence of this insect on their courses and to be prepared for control measures in case such are found necessary. A description of the insect and its habits, and a discussion of control measures, are contained in Farmers' Bulletin 731, United States Department of Agriculture, from which the following quotations and illustration are taken.

"The fully developed parent of the army worm is a moth or 'miller' measuring about 1½ inches across the expanded wings. It is brownish-gray in color, having a single small white spot near the center of the front pair of wings, the hind wings being somewhat darker along the hind edges. Although these parents of the worm sometimes are very numerous, they fly only at night and are therefore often entirely overlooked by the farmer. The stage of the insect most familiar to him is the full-grown, striped, nearly naked caterpillar, usually discovered in the act of devouring his crops and in most cases after having already destroyed the greater portion of the infested crop."

"The army worm injures crops in but one way, and that is by eating away all the tender portions of the leaves, the immature seed, and sprouts, and when numerous it may even devour the plants down to the very ground. The more important and by far the most conspicuous injury is always inflicted by the nearly full-grown caterpillar, whose greed and capacity for food are almost unbelievable. The pupa takes no food. The moth subsists principally upon the nectar gathered from flowers. The army worm feeds by preference upon grasses, both wild and cultivated."

"The army worm, like many other common insect pests, has four forms or stages, as follows: First, the parent moths or millers, which seek out rankly growing grass or grasslike grains, such as millet, upon which they lay their eggs. From these eggs hatch the little caterpillars or 'worms,' which feed and grow rapidly. When full grown they shed



Stages and work of the true army worm and some of its insect enemies: A, Parent or moth; B, full-grown larva; C, eggs; D, pupa in soil; E, parasitic fly laying its eggs on an army worm; F a ground beetle preying upon an army worm, and, at right, Calosoma larva emerging from burrow; G, a digger wasp carrying an army worm to its burrow; H, a wasplike parasite of the army worm. All about natural size.

their skins and change to the brown pupa or resting stage, usually beneath the surface of the soil. From these pupæ come the parent moths, which in turn mate and lay their eggs, thus providing for another brood of caterpillars. There are usually three generations of caterpillars in any one year, but seldom or never two successive outbreaks in any given locality."

"According to the records of the United States Biological Survey, more than 40 species of native wild birds are known to eat the army worm in its various stages. Among the most important of these are the following: Crow blackbird or grackle, yellow-headed blackbird, chipping sparrow, bluebird, prairie hen, and European starling. Domestic fowls of all kinds will greedily devour the caterpillars and pupæ if allowed to roam over infested fields. Skunks and toads also undoubtedly eat thousands of the army worms, both caterpillars and pupæ. These birds and other animals should therefore be encouraged and protected by the farmer by all possible means.

"The importance of watchfulness on the part of the farmer, as a factor in combating the army worm can not be too greatly emphasized. Upon the discovery of the pest in its younger stages depends very largely the possibility of stamping out an infestation before serious injury to crops has occurred. The farmer should examine his meadows frequently during the spring and early summer months, particularly those planted to timothy, bluegrass, and especially millet. He should not be satisfied with looking merely at the surface of the stand; the thicker and longer the growth, the greater the danger from the army worm. The grass or grain should be parted with the hands in various parts of the field and the lower portions of the growth closely examined, in order to discover the presence of the small, greenish caterpillars, and if such be found in any number the area covered by the infestation should be determined and vigorous action taken at once to destroy the worms before they become large enough to begin their journey to other portions of the farm. If the infested spot be small, the grass or grain can be mowed off and straw scattered over the spot and burned, thus destroying the worms. If the caterpillars have become distributed over a considerable area, this can be marked off by stakes and the crop sprayed heavily with a mixture of Paris green at the rate of 1 pound to 50 gallons of water. In case this poison is used, care should be exercised in preventing stock from gaining access to the poisoned grass or grain and being injured or killed by eating it. It is far better to sacrifice a portion of the crop if the destruction of the pest can be accomplished thereby, because if the army worms are not destroyed they will take the crop anyway and probably devastate other portions of the farm.

"Poisoned baits of varying composition have long been used as a means of destroying the many different species of cutworms and also the army worm. An efficient bait of this kind may be prepared and used as follows:

Wheat bran	pounds	50
Paris green or crude arsenic	do	2
Blackstrap molasses	quarts	2
Water	do	2 to 4, or more as needed.

"Mix thoroughly together in a dry state the poison and the bran, then add the diluted molasses and stir vigorously until thoroughly mixed.

"Distribute this bait over the infested field broadcast, taking care to sprinkle or sow it sparingly. In case bran can not be readily obtained, middlings or alfalfa meal may be successfully substituted. This poisoned bait may be safely used in alfalfa and cornfields where it is desired, if possible, to save the crop for forage purposes.

"In case the worms are not discovered until they have begun to travel in a mass, they can usually be destroyed by furrowing or ditching completely around the infested area. In attempting to cross such ditches the worms will fall into them and can easily be destroyed by crushing them with a log dragged back and forth through the ditch or furrow. If shallow post holes are sunk in the bottom of the ditch at intervals of about 20 feet, the worms will crawl along the ditch bottoms and fall into the holes, where they may be destroyed by crushing or other means. If the subsoil be of such a nature that water penetrates it but slowly, the post holes may be partially filled with water, on the top of which a layer of coal oil or petroleum may be poured. Upon falling into such holes, the worms are almost immediately destroyed without further action on the part of the farmer.

"(1) Watch fields of growing grass and grain carefully, especially the meadows, during the spring and early summer months, in order to discover the army worms before they have a chance to become full grown and spread over the entire farm. When the worms are discovered at work do not lose a minute, but attack them vigorously by means of the measures outlined in the foregoing pages.

"(2) In case the worms are crawling in a body, surround them with a furrow or ditch and crush them with a log drag as they fall into it.

"(3) Poison them by spraying crops not intended for forage purposes with 1 pound of Paris green to 50 gallons of water, or with 2 pounds of arsenate of lead to 50 gallons of water. In case the Paris green is used on tender plants, like corn, 2 pounds of freshly slaked lime should be added to 50 gallons of the mixture. This is to prevent burning the tender plants. Where spraying is not practicable, the use of the poisoned bran bait is strongly recommended."

Chemical Weed-Killers on Golf Courses

By L. W. Kephart, U. S. Department of Agriculture

There is no royal road to weed eradication, and for general, every-day weed-fighting there is nothing that beats old-fashioned strong-arm methods with the hands, hoe, scythe, and plow. However, for certain special jobs chemical weed-killers are very useful, and every greenkeeper should know something of their characteristics and how to handle them.

First be it said, before false hopes are raised, that chemicals are not of much help in combating the particular weeds which are most troublesome in turf. Hundreds of tests have been made, and tests are still being conducted, in the use of chemicals in combating crab grass, chickweed, and the other weeds destructive to fine turf, but as yet no really reliable remedy has been found, except where the weeds are treated individually, as in the case of dandelion or plantain injected with sulfuric acid. The place for chemical weed-killers is on the tennis courts, the gravel roads, the cobblestone gutters, the traps, the tees, and other places where no vegetation of any kind is desired but where vegetation never-

theless creeps in. For such places a good chemical poison may save much time and labor.

Sodium arsenite is by far the most common chemical employed in killing weeds. In solution it is one of the most deadly plant poisons known, and it is the basic constituent of practically all proprietary weed-killers, or herbicides. It may be purchased either in the form of a proprietary weed-killer or in the form of a dry salt, and it may also be prepared at home. Most of the commercial weed-killers are efficient, and although the cost is rather excessive yet they are convenient to have on hand and are easy to apply. The use of sodium arsenite in the form of a commercial weed-killer or in the form of a dry salt is recommended for all except the largest jobs of weed-killing. Where the area to be treated is extensive, the cost of material can be reduced one-half or more by preparing the solution at home. If the following directions are carefully followed there should be no difficulty in preparing the substance even by persons unused to handling chemicals.

The formula for preparing sodium arsenite is as follows: 2 pounds caustic soda, or 3 pounds high-grade concentrated lye; 4 pounds white arsenic; 1 gallon water. The caustic soda should be in the granular rather than the solid form. Mix the caustic soda or lye with the arsenic in a wooden, earthenware, or granite receptacle. Add the water slowly, and stir, being careful not to inhale the dust or fumes. The heat generated by the chemical reaction is usually sufficient to cause all of the arsenic to dissolve. In case some of the arsenic remains, heat the liquid until the arsenic disappears. A grayish, sandy sludge often remains in the bottom, which should be strained out if the poison is to be applied with a pressure sprayer. After the solution is cool, add enough water to replace that lost by evaporation. This stock solution will keep for several months in an air-tight receptacle. For use, dilute at the rate of 1 gallon of stock solution in 50 gallons of water.

Sodium arsenite can be applied at any time during the growing season, but best results are obtained if the first application is made in early summer at the time when the vegetation is still soft and succulent. Different manufacturers give different directions for applying the poison; but in general, a large quantity of weak solution is very much better than a small quantity of strong solution. For average conditions, where the vegetation is not over 6 inches high, 1 gallon of concentrated sodium arsenite solution, or 5 pounds of the dry salt, should be added to 50 gallons of water, and this then applied to about 3,600 square feet of surface. If the soil is very dry, it should be moistened a few hours before treatment. If the vegetation is more than 6 inches high, it should be mowed before treatment, to save material. The mowing should be done several days in advance, to allow the vegetation partly to resume growth. Either a sprinkling can or a pressure sprayer may be used for applying the solution, the latter being somewhat more saving of material. One treatment a year, in June, generally suffices for annual weeds, but two treatments, one in early June and another six weeks later, are sometimes needed for persistent perennial weeds like quack grass and buckhorn.

And dont forget this—All compounds of arsenic are deadly poisons when taken internally, and the greatest care should be exercised to avoid swallowing or inhaling them. Areas treated with sodium arsenite should not be played on by children nor grazed by animals until the poison has been washed into the soil by a heavy rain. In handling caustic soda, do not allow it to come in contact with the skin, else painful burns may result.

Next to sodium arsenite, the best all-around weed-killers are the heavier derivatives of crude petroleum. The cheapest and most easily available is the grade known as fuel oil, which is crude oil from which the kerosene, gasoline, and other light oils have been removed. Fuel oils vary considerably in composition and in their value as weed-killers. They are sold according to their specific gravity, those having a specific gravity of about 31 or 32 degrees being best for weed-killing. Fuel oil should be applied at the rate of about 6 gallons to 1,000 square feet of surface.

A number of other oils, especially the coal-tar or creosote oils, are good weed-killers, but they are much more costly that fuel oils.

Oils are used mostly on dirt roads, where they serve the dual purpose of killing weeds and keeping down the dust. They are not recommended for tennis courts or tees.

Another material which has been a popular weed-killer, and for a long time, is common salt. It is not nearly as efficient, however, as sodium arsenite or oil. Its chief field of usefulness is in combating poison ivy, a very objectionable pest with which many courses are infested. A strong salt brine, made at the rate of 3 pounds of salt to 1 gallon of water, sprayed thoroughly over the foliage about the middle of June will destroy a large number of the plants without exposing the workmen to poisoning.

A substance which will keep down all weeds except a few of the most persistent perennials, and at the same time keep the surface of a tennis court or a road in fine condition due to the tremendous capacity it has for absorbing moisture from the air, is calcium chloride. In using it, it should be mixed with the top soil, at the rate of 2 pounds to 1 square yard of surface. Calcium chloride may be purchased in bags or steel drums.

Bur Clover for Southern Fairways on Heavy Soil

By Henry P. Smith, Spring Lake Country Club, Waco, Texas

For the benefit of any of the members of the Green Section who are interested in southern golf courses where Bermuda grass comprises the fairways and greens and where they suffer from an exceedingly tight soil or soil that runs together, which is frequently the case, I can recommend the planting of bur clover in the fairways. While my education in green-keeping has been mostly in the East, where any kind of clover is taboo, nevertheless bur clover planted in the fall will grow luxuriantly, giving the fairways an attractive green appearance, and it is not thick or heavy enough to interfere with the shots through the green. This clover dies down completely by the middle of May and acts as a great stimulus to the growth of Bermuda, as it is heavy with nitrates and has a tendency to pulverize and separate the soil itself, and the Bermuda that comes up where the clover has been is much more luxuriant and healthy than the Bermuda on any of the other parts of the fairways. We planted bur clover extensively last fall and most of our fairways were about 60 per cent covered. One fairway in particular, which was almost 100 per cent covered, is now the best fairway we have; in fact, the turf on this fairway feels almost like a cushion when you tramp on it, in comparison with the hard surfaces where the clover has not been so luxuriant. There can be no doubt that bur clover is a great stimulant to the grass from a fertilizing standpoint and that it has a tendency to loosen the soil. It spreads rapidly and propagates itself. Its seed is contained in a small bur; hence its name.

We have no difficulty in keeping the bur clover out of the greens. If in early spring it becomes too heavy for play, it will die down with the first cutting and by the middle of May will have entirely disappeared, except that the seed burs may be seen scattered throughout the fairways. We are looking forward next year to our fairways being completely covered. As our soil has a tendency to bake badly, the bur clover has without doubt been a great benefit in loosening the soil. On sandy soils or in the black-land country, it is probable, however, that it would be of little advantage.

The Leaf-Spot Disease of Bluegrass

By John Monteith, Jr., United States Department of Agriculture

In the early part of June of this year the Kentucky bluegrass on the fairways of the Pine Valley Golf Club, Clementon, N. J., appeared brown and unhealthy, as if suffering from drouth. Since there had been abundant rainfall it was evident that the browning of the grass must be due to some cause other than insufficient moisture. A close examination of the plants showed that the trouble was due to numerous small spots scattered over the leaves, which gradually spread until the leaves were entirely brown. This same disease was later reported on the fairways of the Merion Cricket Club, Philadelphia. It probably occurs to a greater or less extent on many other courses, since the disease is widespread on bluegrass.

The disease is readily distinguished by the small spots or blotches scattered over the green leaves. These spots have a grayish or light brown center with a reddish-brown or black border. They may be extremely small or may extend across the full width of the leaf. The spots enlarge and join, with the result that the entire leaf becomes brown. They may cause the leaf to wither and gradually become brown without the production of many distinct spots. In severe cases practically every leaf on the plant is killed or badly spotted, but as a rule the youngest leaves are only slightly injured. In extreme cases the plant may be killed at the crown. The fungus causing this disease is closely related to those causing stripe, netblotch, spotblotch, and similar serious diseases of various grain crops. It is quite distinct from the brown-patch fungus. Unlike brown-patch, it is not limited to patches but produces a general dried-up appearance over the whole affected area.

The unusual weather conditions of the spring were apparently exceptionally favorable for the dissemination and development of this disease, for while it has been observed in different parts of the country during the last few years it has not heretofore been regarded as a dangerous pest. Mr. Alan Wilson says this is the first time he has observed this browning of the bluegrass on the Pine Valley course at this season. The fescue growing with the bluegrass on the fairways was green and healthy.

It seems unlikely that the disease will become a serious pest in most seasons. Spraying or dusting with Bordeaux mixture would probably check the disease if the treatment were made as soon as the disease is noticed and before many leaves are killed. However, no such treatment has been reported, and therefore this is not recommended except on a small experimental scale if conditions seem to require such measures. The disease kills the older leaves but takes some time to infect and kill the new blades. Therefore any treatment with quick-acting nitrogenous

fertilizers or top-dressing which would stimulate the plants to produce new leaves would result in hiding the killed leaves and give a more healthy-looking turf. This method will no doubt be found entirely satisfactory, for the disease does not ordinarily kill many plants and therefore produces only a temporary unhealthy appearance of the fairways.

Some U. S. Golf Association Decisions on the Rules of Golf

QUESTION.—An entrant qualifies and defaults his first match. Is he eligible to play in the defeated eights? This question was brought up through a peculiar circumstance connected with the Florida State Amateur Golf Tournament. A qualified in the 6th sixteen; he defaulted the original match, and then he was put in to the defeated eight in that flight. Then he drew a bye that was scheduled to play B for the third round honors. Then B defaulted and A moved in the semi-finals. C and D simultaneously defaulted their third round match. A then was alone in the semi-finals, with only defaults ahead of him, consequently winning the defeated 8th trophy without swinging a club. Can you imagine that such a condition would ever occur?

ANSWER.—The Rules Committee of the United States Golf Association has always taken the stand that a player who has withdrawn from match play is not entitled to compete further in the tournament. This would disqualify the player you mention from playing in the defeated eight. As a matter of information, the United States Golf Association recommends that a man winning the medal prize in a qualifying round for subsequent match play and then withdrawing his score from the match play, is not entitled to the medal play prize, as the Association considers this part of the match play tournament.

QUESTION.—In the Metropolitan Open at Lido, two of the best professionals topped their tee shots in the water at (I think) the 4th hole. Both re-teed balls and continued playing.

ANSWER.—Cases like this are always treated under the specific water-hazard rule, Rule 27, and players therefore would not be allowed to re-tee unless there were a local rule covering the same.

Acid- and Alkaline-Reacting Fertilizers

By R. A. Oakley

The use of the term "acid-reacting" as applied to the word "fertilizers" when undefined is open to just criticism. From a technical standpoint, the term is not a good one, since it does not properly distinguish between the reaction of fertilizers in the test-tube and the reaction in the soil. While in a sense a technical matter, there is need for a simple definition of the terms "acid-reacting" and "alkaline-reacting" fertilizers, for it is the layman and not the technical man who is likely to be confused. The technical man knows that a fertilizer may react acid and yet when applied to a soil upon which plants are growing will tend to make the soil alkaline. He also knows that the reverse of this is true. The layman, on the other hand, is inclined to think that any fertilizer to which the word "acid" is applied is one which will make soil acid when used on plants in the field. For example, it is thought by many that the well-known fertilizer acid phosphate is one that will make soils acid. This is not the case, as is shown by results of numerous critical investigations.

Those who use the term "acid-reacting fertilizer" really mean a fertilizer that, when applied to soil upon which plants are growing or are to be grown, will have a tendency to make the soil acid. By the same conditions, an alkaline-reacting fertilizer is one that, when applied to soil upon which plants are growing or are to be grown, will have a tendency to make the soil alkaline. Ammonium sulfate is a common example of the former, while sodium nitrate is a good example of the latter. In the test-tube, ammonium sulfate is not inclined to react acid; on the contrary, its reaction is toward alkalinity; but when added to the soil, plants avail themselves readily of the ammonium part of the fertilizer and leave the sulfur part, or at least most of it, unused. It is this part that tends to make the soil acid. In the case of sodium nitrate, when this substance is used as a fertilizer, plants use the nitrogen part and leave the sodium in the soil, which tends to make the soil alkaline. This is a crude and very homely explanation, but it is hoped that it will make the case clear.

It is quite an easy matter to make the soil of a putting green alkaline. Lime in any common form will do it in a relatively short time, but it is not nearly so easy to make alkaline or even neutral soils acid. It takes numerous and frequent applications of ammonium sulfate, for example, to offset the effect of a little lime in the soil.

The fertilizer experiments now under way at Arlington indicate that fresh horse manure free from straw has a very definite tendency to make the clay soils there alkaline. Probably most kinds of barnyard manure will react this way to some degree. Theoretically, at least, this is one reason for adding ammonium sulfate to compost before applying it to bent or fescue turf. However, do not conclude from this that manure should not be used on bent or fescue greens. Use it in compost wisely and carefully.

Because of their availability for summer use, it seems advisable to take advantage of this opportunity to discuss briefly two good turf grass fertilizers, namely, cottenseed meal and soybean meal. There is much to be said on the subject. In addition to supplying readily available nitrogen, these meals have another point of advantage for bents and fescues. They tend to make soils to which they have been applied acid. These meals are mentioned here largely because there is need for quick-acting nitrogenous fertilizers which may be used on turf in the hot weather of

summer with little danger of burning. Ammonium sulfate is not such a fertilizer, but either cottonseed meal or soybean meal may be applied at a rate as high as 15 pounds to 1,000 square feet of turf with relative safety at any time of the year.

There is much to be said on the subject of acid- and alkaline-reacting fertilizers. There is much to be done from an investigational standpoint. Active investigations in this field should be encouraged.

The Size of the Fairway

By R. Avery Jones, Baltusrol Golf Club, Short Hills, N. J.

The very interesting article and instructive data on the size of the putting sward which appeared in the December, 1923, number of THE BULLETIN has no doubt resulted in the discovery that some putting greens are nearly half an acre in size. A matter of hardly less importance is the area of the mowed fairway; and judging from the standards set by different clubs, there appears to be considerable difference of opinion as to what constitutes an adequate size of fairway. Fairways averaging 70 yards and with little or no carry from the tee are mowed by some clubs, while other clubs go to the opposite extreme of 100 yards of rough from the tee and mowed fairways averaging 40 yards. The extremes can sometimes be found on the same course. As in the case of the putting sward, the fairway, as regards width, should have proper relation to the type of hole and should take into account the effect of ground contours upon the run or kick of the ball.

While it is deemed impossible to lay down standard measurements for anything in golf architecture, yet standard maintenance is a matter which is discussed and seriously proposed. Maintenance costs of various courses are compared and explanations sought for the seemingly unexplainable differences in expenditure; and in this connection the fact must not be lost sight of that while the areas mowed for fairways vary between 45 and 65 acres, and for putting greens between 5,000 and 9,000 square feet, the budgets of green committees must necessarily vary considerably.

Since every unnecessary yard of fairway means so much waste in labor, fertilizer, seed, and wear and tear of equipment, this subject deserves closer attention than it has received. Furthermore, quite apart from financial considerations and effect upon play, a well-defined and carefully planned fairway adds considerably to the appearance of a hole; a rectangular fairway is a blot on the landscape.

QUESTIONS AND ANSWERS

All questions sent to the Green Committee will be answered in a letter to the writer as promptly as possible. The more interesting of these questions, with concise answers, will appear in this column each month. If your experience leads you to disagree with any answer given in this column, it is your privilege and duty to write to the Green Committee.

While most of the answers are of general application, please bear in mind that each recommendation is intended specifically for the locality designated at the end of the question.

1. FREQUENCY OF TOP-DRESSING; PATCHING GREENS WITH CREEPING BENT STOLONS.—Our greens, which were seeded last fall to fescue and redtop, are coming along fairly well this spring, but they have a considerable number of bare spots. We have compost available for use as top-dressing, but are uncertain as to whether it would be safe to attempt to force grass in this condition by top-dressing with compost to which ammonium sulfate has been added, more than once a month. Kindly advise us on this point. Our greenkeeper is planting stolons of creeping bent on the bare spots of the greens. He obtains these creeping bent stolons from the fairways, and the stolons are taking hold and spreading rapidly. (Maryland.)

ANSWER.—The permissible frequency of top-dressing with compost to which ammonium sulfate has been added depends largely on weather conditions. When there is much rain we believe it would be perfectly safe to top-dress at the rate given on page 111 of the May, 1924, BULLETIN as often as once every two weeks. We have top-dressed as frequently as once a week without deleterious effects, but we have not observed any greater benefits from top-dressing once a week than from top-dressing every two or three weeks. If you continue to top-dress your greens throughout the summer we would suggest that you water the greens thoroughly after each application, as we have found that during hot weather it is easy to burn grass unless the ammonium sulfate is thoroughly watered in. We believe you will obtain good results by planting creeping bent stolons in the bare spots of your greens.

2. RESEEDING AND OTHER PRACTICES IN THE RENOVATION OF FAIRWAY TURF; KENTUCKY BLUEGRASS, REDTOP, BENT, RED FESCUE, AND SHEEP'S FESCUE AS FAIRWAY GRASSES.—Two of our fairways were seeded in September, 1922, and were opened for play in May, 1924. The summer of 1923 was very dry in our locality and a poor season for growing grass. In consequence the fairways were badly burned and baked and made little progress. This year, however, we have had considerable rain, and these fairways have shown much improvement in the past few weeks. The fairways were sown to Kentucky bluegrass and redtop. Our architect has advised that the fairways should be thoroughly disked; seeded, and rolled with a fairly heavy roller, the seed mixture to consist of 60 per cent red fescue, 20 per cent sheep's fescue, and 20 per cent Kentucky bluegrass. How would it do to include bent seed in the mixture? (Pennsylvania.)

ANSWER.—If your turf is even of a very mediocre quality it can be vastly improved by top-dressing and fertilizing. Seeding in turf, with or without disking, is usually a waste of money, and certainly so if red fescue or sheep's fescue is used. Sheep's fescue has no place on the fairways under any conditions. It is marvelous what can be accomplished with relatively poor turf by proper treatment, namely, by top-dressing and fertilizing. In our judgment it is never justifiable to sow seed on established fairway turf, except bent seed, and the use of bent seed needs to be carefully considered on account of its high cost. It is very difficult to get a stand of red fescue by seeding it on established turf. There is practically only one good fairway grass that can be seeded on established sod, and catch, and that is bent grass, either German mixed bent or Rhode Island bent. On account of the high cost of bent seed we do not think you would be justified in using it on large areas. It might be well, however, to use it on the important parts of the fairways—that is, where the tee shots or second shots fall, sowing it at the rate of about 1 pound to 1,000 square feet. The most dependable and most economical

seed mixture for fairways is 3 or 4 pounds of Kentucky bluegrass and 1 pound of recleaned redtop, seeded at the rate of 3 pounds to 1,000 square feet. If bent is to be used in the mixture, ½ pound of the bluegrass might well be replaced with ½ pound of bent seed. Unless the areas to be reseeded are prepared so as to get a good seed bed, we are afraid you will have difficulty in getting first-class results from reseeding. In case you have a good supply of compost top-dressing we would also advise you to utilize the top-dressing as far as you can by mixing the seed well into the compost top-dressing and apply the mixture when you reseed, provided the seeding rate above indicated is maintained.

3. PRODUCING BENT TURF ON STIFF CLAY SOIL.—We have been trying for several years to make a putting green on stiff clay soil, but without much success. We first sowed the green to a mixture of red fescue and redtop, but last year sowed considerable German mixed bent seed along with some redtop, and also top-dressed liberally with sand. At the present time the grass is very thin and the soil very hard. We have thought of removing one or two feet of the clay soil and replacing it with black loam. What would you suggest in the matter? (Minnesota.)

ANSWER.—While it is desirable to have good top soil for a putting green, in our judgment the need for such a soil has been greatly exaggerated. It seems to be in the minds of many that a good top soil should be 6 or 8 inches or even 18 inches deep. Our experience indicates that 3 or 4 inches is ample, and that it is even possible to establish good greens on any ordinary soil. We have accomplished this on a stiff clay soil in the following way. A well-prepared seed bed is made and in the latter part of August or early September sowed to bent seed at the rate of 3 to 5 pounds per 1,000 square feet. The following spring the green is top-dressed with compost consisting of one-fourth good clay loam or loam, one-fourth well-rotted manure, and one-half sand, to which ammonium sulfate has been added at the rate of 15 pounds per cubic yard. The compost is applied at the rate of 1 cubic yard to 5,000 square feet of green. Frequent top-dressings are also applied during the growing season (every 30 days, if possible) with the omission of the ammonium sulfate. This latter should not be applied oftener than three times a year—once in early spring, once in late spring, and once in early fall. At the time of applying compost containing ammonium sulfate, a thorough watering should be given to wash the chemical into the soil. Pure sand as a top-dressing causes the soil to bake; it does not relieve the stiff condition; and we have seen many greens made thin by top-dressing with sand alone, which is particularly the case where the sand contains enough silt to cause it to bake and form a crust. If you have a reasonably good stand of bent grass we believe you could improve the green wonderfully by following the method we have outlined but without even disturbing your present turf. If, however, you decide to prepare an entire new seed bed, it would of course hasten the development of your turf if you would apply 3 or 4 inches of good top soil before seeding.

4. IMPROVING PUTTING GREEN TURF BY THE INTRODUCTION OF BENT SEED.—Our soil is poor and sandy. The turf on the greens is simply the natural grass, which under constant mowing and rolling has become of fair quality. Can you suggest any method by which we could improve this turf without going to the expense of reconstructing the greens? (New York.)

ANSWER.—A great deal can be done to improve your greens by not disturbing the soil at all. Your best method would be to seed, where

necessary, with German mixed bent seed, about the middle of August in your latitude. At the same time the condition of the soil should be improved by frequent top-dressing with compost. An application of ammonium sulfate in the spring and fall of each year at the rate of 3 to 5 pounds to 1,000 square feet will also do much to encourage the spread of the bent grass.

5. Impossibility of Getting Pure Creeping Bent Seed.—We have a letter from a seed firm guaranteeing to furnish us with seed which has been tested and found to be "86 per cent creeping bent." Is this a misstatement, or can it be true? (Illinois.)

Answer.—The "creeping bent seed" of the trade is in reality South German mixed bent seed, which consists of about 85 per cent Rhode Island bent, 15 per cent velvet bent, and a mere trace of true creeping bent. Your seed firm's statement is an error, due perhaps to a misunderstanding. There is no straight creeping bent seed on the market. The only practicable method of establishing putting greens of straight creeping bent is the method of vegetative planting, using selected strains for the purpose. The Rhode Island bent and velvet bent obtained from the German mixed bent seed are good putting green grasses, but they do not possess the pronounced spreading habit of creeping bent.

6. Quack Grass as a Turf Grass; Seeding a Polo Field.—We are preparing to seed a polo field and want to use a grass which will stand hard wear. Would Kentucky bluegrass or quack grass, or the two mixed, be good for the purpose? We seeded the field to redtop and Kentucky bluegrass some time ago, but these do not stand the wear, whereas a small patch of quack grass in the field stands the knocks better. The soil is quite heavy. (Ohio.)

Answer.—While quack grass is fairly tough, our observations lead us to think that under fairly close cutting it would tend to thin out and not make a good covering. If mixed with bluegrass, however, these two grasses might answer your purpose. Since you are on rather heavy soil, we are inclined to advise the use of a mixture of 4 pounds Kentucky bluegrass, 1 pound German mixed bent, and 1 pound recleaned redtop seed, sowed the latter part of August or the first of September at a rate not less than 100 pounds to the acre, and preferably at a somewhat heavier rate.

7. Inadvisability of Using Red Fescue in Mixture with Bent.—We are ready to seed three new greens and are wondering whether it would be advisable to sow these with a mixture of red fescue and bent. Red fescue seems to do very well here. (Pennsylvania.)

Answer.—We consider it a mistake to sow a mixture of red fescue and bent. In our experience, the former grass will not survive the close cutting that is necessary for good results with bent in putting greens. Moreover, the bent is certain to crowd out the red fescue plants in a relatively short time, so that the use of red fescue seed would be a waste of money.

8. Spiked Rollers and Weed Control.—We cut out the chickweed and yarrow in our putting greens, by the use of a hole cutter where the weeds are that size, and replace with creeping bent turf from our nursery, of which we have one acre. It has been suggested to us that we use a spiked roller and sow bent seed on the greens as a means of crowding out weeds. Which do you think is the better method? (Pennsylvania.)

ANSWER.—The method you are pursuing of cutting out perennial weeds and replacing with good turf is absolutely the best method to use in fighting weeds on putting greens. Spiked rollers will not remove weeds whether followed by seeding or not. All of our experiments with spiked rollers and similar devices have resulted in injury to the turf. In the light of our present knowledge we do not advise using them except in an experimental way, spiking a portion of a green and comparing the behavior of the spiked portion with an unspiked portion.

9. USE OF SALT FOR KILLING WEEDS IN BUNKERS.—Could you give me any information with regard to killing weeds in bunkers? We have a power sprayer. (Oregon.)

ANSWER.—Probably the most convenient and effective preparation for killing most kinds of weeds is common salt. If applied dry, 30 to 50 pounds per 1,000 square feet should be used. If applied in solution, make the solution as strong as possible, using about 3½ pounds to a gallon of water, and apply with a sprinkler or sprayer at the rate of 6 to 9 gallons per 1,000 square feet.

10. DESTROYING WEED SEEDS AND PLANTS BY COMPOSTING.—Can the plants and seeds of pearlwort be killed by burying them in a covered pit for two years? (Massachusetts.)

ANSWER.—Seeds and plants of pearlwort and other weeds are killed by composting them. If the compost pile contains manure, a period of one year will generally suffice for killing the weed seeds and plants.

11. FAIRWAYS AND PUTTING GREENS WHERE WATERING IS IMPOSSIBLE. —Can you recommend any grasses that would make satisfactory fairways and putting greens in this section where no facilities for watering are available? (Washington.)

ANSWER.—Your proposition is a difficult one. On the whole we would think you would find Kentucky bluegrass satisfactory for your fairways. Brome grass will make a coarse sort of turf on even drier ground than will bluegrass. White clover may well be added with the bluegrass, as it will help out greatly, particularly in spring. There is however no grass which will not dry up during the long dry season under the conditions you propose. Where there are areas of the fairway which are thin in the fall we think it would pay to sow these spots with redtop and Italian ryegrass as early as possible in the spring, or, even better, to sow the seed on top of the snow in the winter; both of these grasses grow rapidly and will help out during the spring and early summer. Without water for your putting greens you had better not try to have grass greens, but resort to sand greens.

12. ERADICATION OF KNOT GRASS.—We are having considerable trouble throughout our course, particularly on the fairways, with a weed we believe to be "hog grass," although in all probability you may have another name for it in the classification of weeds. We are sending you a specimen of this grass. What method can we use in exterminating this weed? Ohio.)

ANSWER.—The weed you send is knot weed, sometimes called knot grass, but not a true grass but a member of the buckwheat family. Scientifically it is known as *Polygonum aviculare*. The plant is readily eaten by hogs and by cattle, and often is very abundant along roadsides and other hard tramped ground. On golf courses it rarely occurs excepting where the ground is thin and poor, and any treatment which results in a dense turf will practically do away with any further trouble from the knot weed. It is an annual, and where necessary can easily be eradicated by hand-weeding.

MR. GREEN-COMMITTEE CHAIRMAN:

Midsummer is the time to give your greenkeeper all the encouragement possible.

Give him more than words of cheer. Give him laborers enough to carry out his summer program successfully.

This is the critical time of the year.

Greens must have first call on the Club's resources. Crab grass and other summer weeds must be fought to a standstill; and to do this properly the young plants must be pulled as soon as they show themselves. Do not be deluded into thinking that your greens are crab-grass proof. They may resist crab grass to a considerable degree, but they need your help.

Brown-patch, too, may take a notion to attack almost any hot, sultry night. Give your greenkeeper facilities for applying Bordeaux, and help him train his men to use this fungicide properly. He will need a force of men to water the greens early in the morning while the brown-patch is on. This is not a preventive, but it offers help; and if the worst should befall and brown-patch should hit hard, be prepared without delay to give first aid with compost and quick-acting nitrogenous fertilizers.

Mowing must not be neglected. Bent greens must be mowed closely and frequently; fescue greens, less closely, but frequently.

Keep the water system in good repair. The greens will tell you when they need water, and how much.

Do not let anything distract attention from the greens. Think of the rest of the course as a mere side line, if you must. Neglect the fairways and the rough, if necessary, and let whiskers grow on the bunkers. From now till the cool weather of fall, the greens are the thing.

Forget business, vacation, politics, and even family, but stick to the greens.

THE PERIPATETIC GOLFER.