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of the

UNITED STATES GOLF ASSOCIATION GREEN SECTION

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Contents

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Bent Greens in Southern Virginia and North Carolina

There has always been a question whether the bent-grasses were practicable for use in putting greens as far south as southern Virginia and North Carolina except in the mountains. Mr. W. E. Barret, president of the Hermitage Country Club, Richmond, Va., has demonstrated the value of creeping bent at Richmond. His experiences are of considerable interest in this connection, and he has kindly consented that THE BULLETIN publish a copy of his letter of July 24, 1926, to Mr. C. G. Holland, president of the Piedmont Green-Committeemen's Association, of Danville, Va. His letter follows:

"Our experience here at the Hermitage Country Club with the creeping bent greens is highly satisfactory. We began these experiments about four years ago, when we planted a nursery with several different strains of creeping bent given us by Dr. Oakley from the Arlington Experimental plots.

"Our No. 17 green, planted with stolons of the Washington strain, is three years old, and is now and has been for more than two years an almost perfect putting green. Last October we put in four additional greens from Washington strain creeping bent stolons, and we began putting on these greens in May. They have done beautifully up until two weeks ago, when some of them developed a rather severe attack of brown-patch. However they are recovering from this and are still good greens, and I am sure in about a month's time, when the bent-grass begins its fall growth, they will be better than ever. Of course creeping bent-grass is subject to the brown-patch disease, but notwithstanding this it is far more satisfactory and less expensive to maintain than Bermuda or redtop or bluegrass or white clover or any combination of these grasses.

"Experience has taught us that we can not count on getting a good putting green at Richmond from Bermuda before July, and in an unfavorable season not before August. The Bermuda of course browns in November, and by early spring all of it above ground has largely rotted away and is unfit for putting, so that in the important golf months of March, April, May and June the conditions are very bad. With the most favorable season and everything working just right we can have good greens here from Bermuda for the five months of July to November, inclusive, but this means seven months out of the twelve with miserable putting conditions.

"It is probable, in my judgment, that you can have just as good creeping bent greens at Danville as have been grown in the latitude of Richmond, and I also believe the same would apply to Greensboro and Winston-Salem (North Carolina.) It was thought for some time that Richmond was too far south for this grass to succeed, but with

your higher altitude and naturally better grass conditions, creeping bent should do just as well with you as it does with us. If it can be grown by you successfully you can feel well assured that no other grass is worth a moment's consideration.

"I might add that we are now arranging to put all the rest of our greens in bent this fall."

The Experiment in Grub-Proofing Turf at Riverton, N. J.

By B. R. Leach and J. W. Lipp

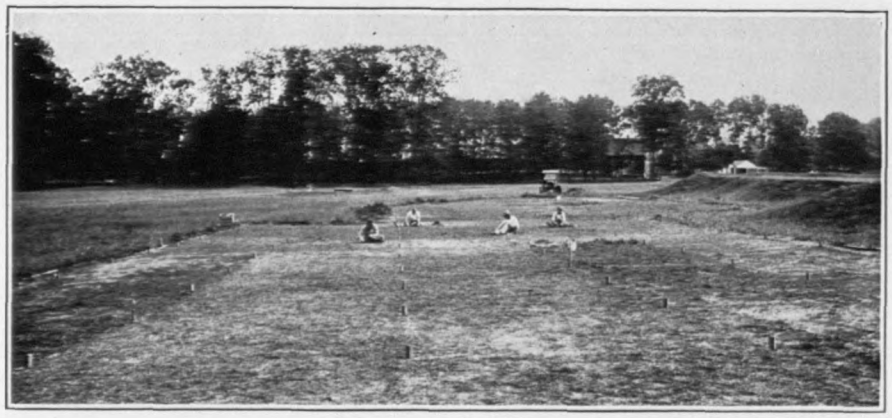
An account of previous work in this experiment was published in THE BULLETIN for February, 1926 (pages 34 to 39.) The accompanying illustrations show the progress of the work to date. There is a total of 105 experimental plots in the area occupied by the experiments, each plot being 10 feet square. A definite treatment as regards the amount and depth of application of the poison is being given to each of the plots. The grasses under test include creeping bent, German mixed bent, Canada bluegrass, and rough-stalked bluegrass (*Poa trivialis.*)

Preparing one of the poisons used in grub-proofing turf.

Plowing the ground for the experimental plots, Riverton (N. J.) Country Club. This is a piece of the rough which had not been plowed for many years. Sandy loam soil.

A section of the plowed area leveled and divided into plots 10 feet square, ready for the poison treatment.

Working the poison into the soil.



Weeding the experimental plots for the first time, a month after planting. An outstanding development in connection with the work on the grub-proofing of turf has been the decided checking of weed growth in the poisoned soil. The checking is especially noticeable on crab-grass.

Farm Manures

By H. L. Westover

Farm manure consists of a mixture of the dung or feces and urine of domestic animals, with the material used for bedding, including straw, peat, muck, leaves, sawdust, shavings, and other vegetable refuse. It is known under a variety of names, such as manure, barn manure, stable manure, farmyard manure, barnyard manure. It was one of the earliest materials to be used for soil improvement, and no other fertilizer used by the farmer for this purpose is so thoroughly appreciated as farm manure. In addition to furnishing a small amount of plant food, it supplies humus, which increases the water-holding capacity of the soil, improves its physical character, and makes the soil a more favorable medium for the growth of bacteria so essential to soil improvement.

Value of Farm Manure on the Golf Course

Farm manure is one of the best fertilizers for turf grasses. In fact, it is very difficult to grow these grasses satisfactorily on certain soils without a liberal application of farm manure. The value of the manure is due not so much to the nitrogen, phosphorus, potassium, and organic matter furnished, all of which may be supplied in other forms, as to the numerous beneficial organisms and their products which the manure carries. It is also probable that there are in the manure other beneficial agents whose value can not be measured.

While fresh manure ordinarily contains more readily available plant food, well-rotted manure is preferable for the golf course. When rotted in a well-compacted and moistened pile, the manure loses little in fertilizer value, weed seeds are destroyed, coarse material is broken down so that it may be evenly distributed, and the bacterial flora is increased. At least six months is required to bring about this condition, though a longer time is preferable provided the pile is properly protected.

Where the quantity is limited, its value may be greatly increased by composting it with loam, sod, or similar material. It is highly desirable that the pile be worked over two or three times before it is used, in order that the material may be thoroughly mixed.

In sowing fairways, particularly if the soil is low in fertility or deficient in humus, a liberal application of well-rotted farm manure worked into the top two inches of soil will be found highly beneficial. It also gives excellent results as a topdressing for fairways, though it is objectionable where it interferes with play. Where courses are closed during the winter, a light application of fine manure in the fall after play ceases will improve the turf. It should be evenly distributed, otherwise the grass will be smothered out in spots. In the spring any coarse material remaining should be raked off.

In preparing soil for putting greens, fine well-rotted manure worked into the soil before sowing the seed will be beneficial, particularly if the soil is low in fertility or of a very light sandy texture. On soils of average productivity, however, better results will be obtained where the manure is used with loam or sand in making compost to be employed as a topdressing. Frequent topdressings of farm manure alone have a tendency to encourage the weedy growth in the greens. Furthermore, too liberal use of barnyard manure is

almost certain to increase the number of earthworms and other pests.

Composition of Farm Manures and Factors Influencing It

The composition of farm manure is extremely variable, but a ton of average material contains about 1,500 pounds of water, 10 pounds of nitrogen, 5 pounds of phosphorus, and 10 pounds of potash, or a total of 25 pounds of actual plant food constituents not including lime.

Factors influencing the composition of the manure are (1) the kind of animal producing it, (2) the food the animals consume, (3) the kind and quantity of litter used in the stable or yard, and (4) the manner in which the litter is cared for.

There is considerable variation in the manure of different animals, due in part to the amount of water carried in the excrements. Cow and hog manures carry much more water than the manure from sheep and poultry, and are therefore less concentrated, or, in other words, carry a smaller percentage of nitrogen, phosphorus, and potassium.

The composition of farm manure is also greatly influenced by the character of the food consumed. The nitrogen, phosphorus, and potassium taken into the body pass through largely in the form of excrements. It is therefore obvious that the amount of these elements in the excrements is more or less dependent on the food eaten. There can be no more in the excrements than is taken in the food, but they are usually in a more readily available form as plant food. The solid material consists largely of the undigested portions that were not acted on in the digestive process and likewise are not readily made available in the soil by bacterial action as food for plants. As a result of having passed through the digestive tract, the material is however in a finer and softer condition, and therefore more quickly available than the same constituents in the food before it was taken by the animals. It is evident that the larger the amount of indigestible material in the food the larger is the amount of slowly available plant food in the excrements. The constituents of the urine, on the other hand, are in a soluble form, and are either directly available as plant food or readily become so. The more digestible the food, the larger the proportion of plant-food constituents in the urine. Generally speaking, foods rich in nitrogen are more digestible than those low in nitrogen, which results in larger amounts of nitrogen in the urine.

The composition of the manure is influenced by the litter, the value of which from a fertilizing standpoint is (1) to absorb and retain urine, (2) to increase organic matter and plant food, (3) to prevent the escape of ammonia in the air, (4) to make the material easier to handle, and (5) to influence physical and chemical action. The materials most commonly used as litter are straw from the various cereal crops (such as oats, rye, barley, and wheat), muck, peat-moss, sawdust, shavings, and leaves. The straw and leaves add nitrogen, phosphoric acid, and potash to the manure. Muck and peat-moss add nitrogen, but in a form that is not readily available. The nitrogen, phosphoric acid, and potash in sawdust and shavings are very slowly available. Moreover, in fresh stable manure, shavings and sawdust from cone-bearing trees, like the pines, spruces, and firs, are apt to be

toxic to plants. This condition is overcome by allowing the manure to rot thoroughly before using.

The value of farm manure may be greatly affected by the method of caring for it. In spite of its many advantages, so little attention is given to the proper preservation of farm manure that enormous losses result. In the average farm manure, about one-half the value of the nitrogen and two-thirds the value of the potash, or a total of about 50 percent of the plant-food constituents, are in the urine. When no effort is made to save the urine, as is all too commonly the case, a large part of the most readily available portion is lost. The losses from leaching by exposure to rains are also enormous. It is a common practice to throw the manure in the yard, often under the eaves, where it remains unprotected for months. In the course of six months, from 60 to 70 percent of its plant-food constituents may be lost. Further losses occur through the escape of nitrogen as ammonia, where air has free access to a manure pile which is not properly compacted. These losses can be overcome to a large extent by having tight floors and gutters to hold the urine and then using sufficient litter to absorb the liquid portion, by keeping manure under cover to prevent leaching, and by keeping the piles well compacted and thoroughly moistened to check heating and consequent loss of nitrogen as ammonia. The greater value of the manure will abundantly repay this additional effort.

Horse Manure.—A ton of fresh horse manure contains on the average about 1,560 pounds of water, 14 pounds of nitrogen, 5 pounds of phosphoric acid, and 11 pounds of potash. On account of the less complete destruction in the process of digestion of the organic material in the food eaten, horse manure furnishes abundant food for the micro-organisms that promote decay, and as a result it is subject to various kinds of fermentation. The evolution of heat in the manure is due to a special type of fermentation, and unless care is taken to have the manure pile well compacted a condition known as "fire-fanged" develops, resulting in a loss of much of the fertilizing value of the manure. The impression that horse manure is of little value is due to the fact that it deteriorates rapidly when proper precautions are not taken to preserve it. For the golf course, good horse manure is about equal to cow manure, and preferable to either sheep or poultry manure, as the larger amounts used furnish more organic matter or humus, which is a most important factor in growing turf grasses. Any deficiency in food constituents is easily supplied through the use of chemical fertilizers.

Cow manure.—In composition, cow manure does not vary widely from horse manure. A ton of average fresh manure contains 1,720 pounds of water, 12 pounds of nitrogen, 3 pounds of phosphoric acid, and 9 pounds of potash. It represents material that is more completely digested than does horse manure, and is far more compact. Due to the compactness and also to the larger amount of water in cow manure, there is not the same danger of losses through heating as in horse manure. Cow manure is preferable to sheep or poultry manure for use on golf courses for the reasons given in the case of horse manure. Shredded cow manure is sometimes offered on the market, but when dried, shredded, or otherwise treated it loses much of its value. Its best form is as ordinary well-rotted manure.

Sheep manure.—A ton of average fresh sheep manure contains 1,360 pounds of water, 19 pounds of nitrogen, 7 pounds of phosphoric acid, and 20 pounds of potash. It is a quick-acting fertilizer, and because of the small amount of water contained it is concentrated in composition and therefore prized by florists. In amounts ordinarily used, it does not supply much organic matter, and is therefore not nearly as satisfactory for use on golf courses as well-rotted barnyard manure, though it is much more easily applied. Any sheep manure available should be used in the compost heap. The cost of the dried sheep manure on the market is all out of proportion to its actual value.

Hog manure.—A ton of average fresh hog manure contains 1,740 pounds of water, 10 pounds of nitrogen, 7 pounds of phosphoric acid, and 8 pounds of potash. On account of the varied character of food consumed, the composition of the manure is more variable than that of other farm animals. Since it contains a high percentage of water, losses by leaching readily occur. Hog manure has been placed on the market in dried form, but, like dried sheep manure, the cost is all out of proportion to its actual fertilizing value.

Poultry manure.—While variable in composition, a ton of average fresh poultry manure contains about 1,100 pounds of water, 20 pounds of nitrogen, 16 pounds of phosphoric acid, and 8 pounds of potash. As the nitrogen is usually in the form of an ammonium compound it is a quick-acting fertilizer. Poultry manure ferments readily, and without proper care much of the nitrogen is lost as ammonia. It is not advisable to mix poultry manure with wood ashes or ordinary lime, as the ammonia is readily liberated when it comes in contact with an alkaline compound. It is an excellent fertilizer if mixed in a compost heap or with rich soil at the rate of 10 pounds of manure to 100 pounds of soil. If applied alone it is apt to burn the grass. It does not supply nearly the amount of organic matter that well-rotted stable manure furnishes.

Mushroom soil.—Mushroom soil or spent mushroom soil is treated in this article, as it is really little more than well-rotted manure. It is what remains of a good quality of horse manure after it has been in the mushroom cellar for a year. In preparing the fresh manure for the mushroom bed it is placed in a pile for three weeks, being turned occasionally to prevent the temperature from reaching a point where the manure burns or becomes "fire-fanged." After having served its purpose in the mushroom bed, the manure has lost little of the fertilizer value and is highly desirable for use on the golf course as topdressing for putting greens. Mushroom soil should not be used alone. Much better results are obtained where it is composted with sand and loam.

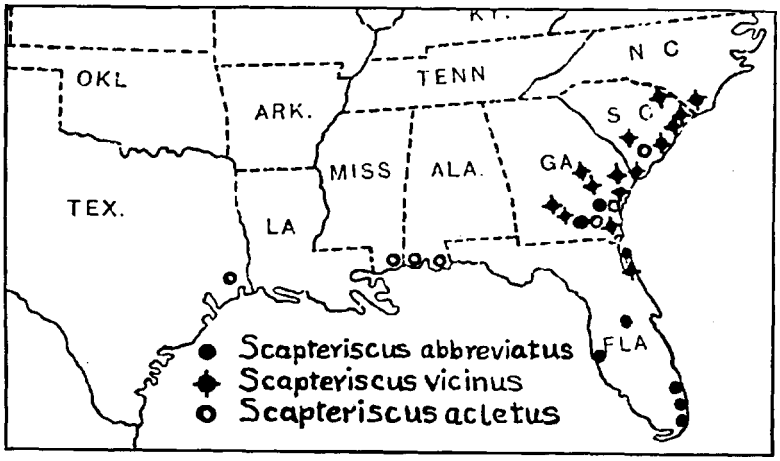
Moisture-holding capacity of soils.—Tests have shown that while 100 pounds of sand can hold only 25 pounds of water, and 100 pounds of clay 50 pounds of water, the same weight of humus or decaying organic matter can retain 190 pounds of water. The addition of humus to sandy soils or others deficient in organic matter is therefore an effective means of increasing their moisture-holding capacity.

The Control of the Porto Rican Mole-Cricket, or Changa, on Golf Courses

By W. A. Thomas, U. S. Bureau of Entomology

Many complaints have been received from golf clubs in the southeastern United States, the West Indies, and even from South America relating to the destruction wrought to greens and fairways by the Porto Rican mole-cricket, or changa (*Scapteriscus vicinus*).

This insect is a native of the West Indies and South America, and has been known to occur in several sections of the southeastern United States for a period of more than 20 years, but only recently has it come to the attention of golf clubs in the infested areas through its destruction of the grass on golf courses. Its spread, comparatively slow for several years, has recently gained momentum, and it now infests a large portion of the coastal section from Alabama to North Carolina. Its spread inland has been less rapid than that along the coast, but in many cases the infested area extends for more than 100 miles from the coast. Its distribution July 1, 1925, along with that of two of its close relatives, is shown on the accompanying map.



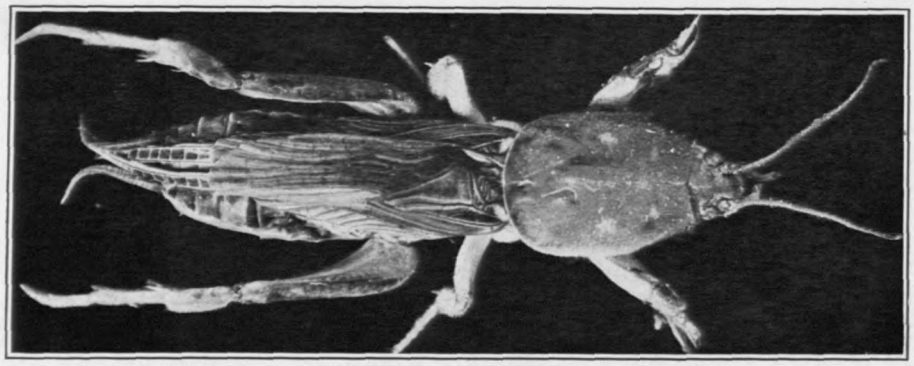
Map showing distribution on July 1, 1925, of the Porto Rican mole-cricket and its near relatives (Scapteriscus species) in the infested portion of the United States. Up to the present the principal injury to golf grasses has been caused by the Porto Rican mole-cricket (Scapteriscus vicinus).

The changa, or mole-cricket, also known as the ground-puppy in some localities, is brownish in color and approximately 1¼ inches in length when full grown. It is scarcely at all cricket-like in appearance, the body being longer than that of the common field-cricket, and the front feet are shovel-like, being modified for digging and resembling those of the common ground-mole. In the following illustration is shown an enlargement of a full-grown changa. The adult changa has well-developed wings and is capable of swift flight; but the insect is seldom observed in flight, except when it is attracted to strong lights near the close of the egg-laying period, which occurs in late July and early August in the Carolinas.

The eggs are oval in shape, about ⅛-inch long and 1/16-inch thick, and slightly greenish in color. They are laid in small oval chambers in the soil, at an average depth of about 2½ inches. The

eggs hatch, in about three weeks, into extremely active young, or nymphs, which have ravenous appetites and during the period of rapid growth to the adult stage consume large quantities of vegetable and animal matter found in the soil. They are especially fond of succulent grass roots and are capable of destroying large areas of turf in a short time. The young, or immature form, in general appearance closely resembles the adult, except that it is smaller and wingless.

For the control of the pest on lands under cultivation a poison bait has been used for several years with good results; this method has not however been tested under grassland conditions and it has therefore been necessary to develop a method of control adaptable to the new environmental conditions. By invitation of the Jekyl Island Club, of Brunswick, Ga., the experimental work was located on its course, and much of the credit for the success of the work is due to the loyal cooperation and support of its members. Tests were made with various materials and methods, of which only the three will be mentioned which gave satisfactory results, namely, carbon disulfid, calcium cyanide, and poison bait.



Porto Rican mole-cricket, or changa (Scapteriscus vicinus). Enlarged. The full-grown insect is about 1¼ inches long.

In the experiments with carbon disulfid emulsion, a commercial product was employed which contained 75 percent of carbon disulfid. One part of this emulsion was mixed with 400 parts of water and sprinkled over the green at the rate of 2 quarts to the square foot of area and as rapidly as the ground would absorb it. In practice it was found to be more satisfactory, in order to avoid rapid vaporization of the emulsion, to make the application late in the afternoon when there was little air movement and the humidity was high. If the green was extremely dry, it was sprinkled for about 20 minutes before the emulsion was applied, in order to aid the penetration of the emulsion and prevent the puddling of the solution on top of the soil.

This treatment resulted in a control of slightly more than 95 percent, the effects of the treatment being apparent for only about one month, after which time reinfestation from the fairways began to take place around the edges of the green. In the course of from four to six weeks, the infestation was sufficiently heavy to justify an additional treatment.

The cost of one application per green was as follows: Material, 3¾ gallons of stock solution of carbon disulfid emulsion at about $2

per gallon, about $7.50; labor, mixing and applying, 6 hours at 40 cents, $2.40; total, $9.90. The price of the commercial stock solution has not yet been fixed and the figure given is only approximately correct.

In the experiments with calcium cyanide, a commercial cyanide dust was employed which contained approximately 40 percent actual calcium cyanide. Thirty pounds of this material was mixed with 500 gallons of water, and this was poured as evenly as possible over the entire green through a ¾-inch hose, the flow being so regulated as to prevent excessive run-off. The amount mentioned was sufficient to cover approximately 4,400 square feet, about the average size of the ordinary putting green. During the process of application the solution was kept thoroughly agitated to prevent settling. As soon as the solution was applied, sprinklers were set running, and as far as possible were kept going all night to carry the material thoroughly into the soil. As far as practicable, all applications were made in the afternoon when there was little wind blowing.

As far as could be determined, this treatment was as effective as the carbon disulfid emulsion, affording a control of slightly more than 95 percent, but, like the emulsion, its effects lasted for only about a month. After this time the reinfestation had developed sufficiently to make necessary an additional treatment.

It must be remembered that a green treated with a solution of calcium cyanide must be thoroughly sprinkled to prevent burning of the grass.

Cost of one application with calcium cyanide, per green: Material, 30 pounds of calcium cyanide at 19 cents, $5.70; labor, making application, 4 hours at 40 cents, $1.60; total, $7.30.

In the experiments with poison bait, the same material was employed as used for the control of the pest in cultivated fields. In its application the bait was scattered lightly over the infested green and adjacent fairways. As the insect feeds at night, the bait was applied as far as practicable late in the afternoon to prevent excessive drying out before the mole-crickets had access to it.

The bait consisted of 100 pounds of cottonseed meal, 100 pounds of rice flour, and 10 pounds of calcium arsenate moistened with a cheap molasses solution. In preparing this material the proper amounts of cottonseed meal, rice flour, and calcium arsenate should be thoroughly mixed together and then the solution of low-grade molasses, 1 part to 10 parts of water, added to the mixture in sufficient quantities to make the bait crumbly, care being taken to see that just the right amount of sweetened water is added to avoid the possibility of having the bait too liquid.

Three applications of this bait at the rate of 15 pounds to the green, or 150 pounds per acre, when made weekly or at 10-day intervals, gave excellent control. Although the effect was not as immediate as with the carbon disulfid and calcium cyanide treatments, the low cost of the material and the ease of application made it practicable to treat not only the green but also the adjacent infested fairways, thus preventing early reinfestation of the green.

Cost of three applications of poison bait, per green: Material, 45 pounds of poison bait at 4 cents per pound, $1.80; labor, mixing and applying, 1½ hours at 40 cents, 60 cents; total, $2.40.

The results of these experiments show that both greens and fairways can be economically and effectively treated with the poison bait. The carbon disulfid emulsion and calcium cyanide gave effective results; but the cost of treating fairways is so great as to make their use for this purpose almost prohibitive, and in the absence of fairway treatment the greens soon become reinfested.

Where immediate results are required to protect the green from great damage, either the carbon disulfid emulsion or calcium cyanide treatment should be used on the green and the poison bait applied thoroughly to all surrounding infested areas to prevent reinfestation of the green.

Where the course is in use every day, the poison bait will be found more satisfactory on both greens and fairways, as immediate use of greens after making an application of either carbon disulfid emulsion or calcium cyanide will usually result in some injury to the grass.

On badly infested courses, after concentrated treatment has stopped, an application of poison bait should be made at periods of a month to six weeks during the warmer months of the year to prevent a recurrence of the infestation. The poison bait as far as practicable should be applied the same day as prepared. If it is allowed to stand for several days, a fermentation takes place which almost completely destroys its attractive qualities.

Pulverized manures, including that of poultry, sheep, swine, and others, are valuable as ingredients of compost designed for topdressing purposes, of which they should constitute about 10 percent of the total material. If well-rotted barnyard manure is available, however, it is to be preferred, but it should constitute about 20 percent of the total material. When pulverized manures are applied to turf not mixed with compost, much of their value is lost, due to the material being washed or blown away before it becomes available as plant food.

Birds of the Golf Course

The Flicker

By W. L. McAtee

The flicker has what is known as a colorful personality. His size, striking plumage, varied calls, and interesting antics in the mating season, have attracted general attention. As one result of the interest which the bird has inspired, nearly 150 different local names have been applied to it. Among these are yellow-hammer, pigeon woodpecker, high-holder, hairy-wicket, looping bird, and flying auger. It is the only one of our woodpeckers that spends much time on the ground. The yellow breast with black spots and crescent, the cinnamon-and-black barred back, and the white rump conspicuous in flight, are good field marks for recognition of the flicker. The eastern bird shows bright yellow in the flight feathers of the wings when they are extended, and the western one red. These two forms meet on the Great Plains and along the eastern edge of the Rocky Mountain region, where they hybridize freely. Flickers occur throughout the United States.

The Flicker.

Not for nothing have flickers partially abandoned the security of the tree retreats preferred by most of the woodpecker race, and taken to the ground. No, they have alluring objectives, the principal one, no doubt, being ants, which compose half of their entire subsistence. Now this is a very good thing for golf courses, for ants are among the peskiest of the insect pests of the links. It is ants that persist in throwing up those miniature volcanoes of earth pellets commonly seen on putting greens, a feature renewed daily, regardless of sprinkling and rolling, if the little miners are not destroyed. Ant eradication often proves difficult, and birds like the flicker, that make it their chief business, should be looked upon with a friendly eye by the greenkeeper. In many cases flickers have been known to consume a thousand ants at a meal; even two and three thousand at times are taken, and in one stomach and gullet examined by the United States Biological Survey were found no fewer than 5,040 ants. A bird with so pronounced a liking for ants certainly is one of our most efficient allies in efforts to control these tiny pests.

The usefulness of flickers is by no means confined to ant destruction, for the birds are fond of the white grubs, and of dung-beetles that are pests of putting greens, and of the grasshoppers, caterpillars, and wireworms that damage the fairways. Other nuisances of the golf course that flickers are known to prey upon include clover-leaf and clover-root weevils, larvae of March-flies and crane-flies, the chinch-bug, mole-cricket, crawfish, and certain small bees that burrow in greens.

Some have complained of the holes flickers make when digging out pests; but that is like objecting to the surgeon making an incision to remove an obstreperous appendix. In both cases the wound will heal and there has been removed an offending factor which if allowed to remain would have been a persistent source of trouble. Therefore, smooth out the flicker's excavations and thank the bird for doing away with some of the little pests that are so difficult for man effectively to combat.

The flicker may be attracted to the golf course and paid for his services by providing nest boxes. These birds can excavate nests for themselves only in partly rotted wood, and the large dead limbs of trees which are preferred for the purpose are constantly growing scarcer. A box with floor space of about 7 by 7 inches, 16 to 18 inches deep inside, with a 2½-inch entrance 14 to 16 inches above the floor, will accommodate a flicker family. The roof should be sloping to shed rain, and overhanging to protect the entrance. Put in the box enough sawdust or fine shavings to make a good bed over the bottom, or the flicker will proceed to manufacture something similar by pecking the inside of the box. Flickers are fond of certain wild fruits, especially berries of sour gum, sumac, and dogwood, wild cherries, elderberries, blackberries, hackberries, and bayberries. If supplies of these are available about the course, it will be a flicker heaven, and if not already present some of them can easily be planted to the delectation not only of the flicker but also of other useful birds.

A Steam-Box for Killing Weed Seeds in Compost*

By D. M. Boude, Miami Valley Golf Club, Dayton, Ohio

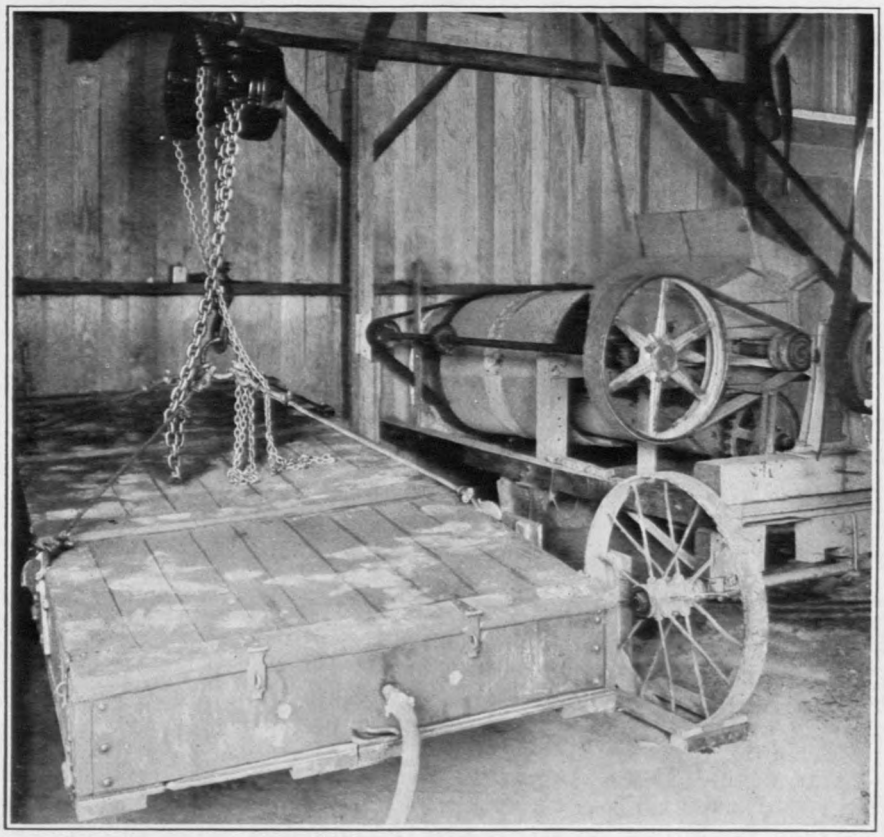
The Miami Valley of Ohio has always been a great tobacco center. After the timber had been cleared and the supply of brush for burning plant beds had disappeared, the farmers originated the idea of steaming their plant beds before seeding.

At a meeting of the Dayton District Golf Association Green Section, in Troy, Ohio, early in 1925, a tobacco farmer, who was a member of the Troy Country Club, advanced the idea of steaming compost and steaming the beds for greens before planting stolons. As a culmination of the discussion, Mr. C. F. Young, of the Miami Valley Golf Club, suggested that we put in a steamer and give it a trial. Our greenkeeper, Mr. A. P. Bilsbrough, designed a box in connection with a mixer that he had previously designed, whereby we are able to steam approximately 18 yards of compost per day, at a cost of $1.35 per yard including mixing.

A photograph of the steam-box and compost mixer is here produced, also a diagram of the construction of the box. The steam is supplied through a ¾-inch pipe extending lengthwise through the middle of the box and drilled stagger-fashion with ⅛-inch outlet holes. The box is constructed of boards, with the cover and bottom tongued and grooved. The dimensions of the box are 10 inches deep by 4 feet wide by 10 feet long, affording a capacity of slightly more than one cubic yard of compost. The bottom is in two sections hinged along the sides of the box and opening through the middle to permit dumping the contents. By the use of a hoist which runs on a track overhead, the box may be moved at will from one end of the shed to the other. The box is placed near the compost mixer and screen, the cover is removed, and the box is filled with the mixed and screened material directly from the machine. The top is then replaced, and the box may be moved away from the screening and mixing machine, where it will not interfere with the work, while the steam, at 100

* A bake-oven for killing weed seeds in compost was described in THE BULLETIN for January, 1926, page 5, and the use of a steam-pan in THE BULLETIN for October, 1925, page 232.—EDITORS.

pounds pressure, is being forced into the box. After the steam has been allowed to penetrate the soil for 20 minutes, the box is lifted by means of the hoist and moved to the storage bin, where it is dumped by removing the pins which hold the bottom. During the steaming the soil is raised to a temperature ranging from 185 to 205 degrees, Fahrenheit.



Steam-box for killing weed seeds in compost.

We steamed several samples of compost and placed them in a greenhouse together with samples of compost not steamed, under ideal conditions for germination. The unsteamed samples developed most of the weeds present on our Ohio greens. The steamed samples were absolutely free from weeds.

The question then arose as to whether when killing the weed seeds in this manner we were also destroying the bacteria and the value of the humus and plant nutriments in the soil. This had been fairly well settled to our satisfaction in the first discussion on steaming, since the farmers are able to get their tobacco plants two weeks earlier in the steamed beds, and get much sturdier plants. However, we again took samples of our steamed and unsteamed compost to the greenhouse, sowing them with redtop. The steamed samples germinated first and developed a deeper, richer color than those in the unsteamed samples.

This past season we feel we have been amply paid for our steaming outfit, as we have not had to weed any of the ten Washington bent greens and have been able to give our members perfect putting surfaces through the entire season. The weeding has in past seasons cost us from $1,000 to $1,500 each year, while our steamer cost us only $650 and will last for many seasons.

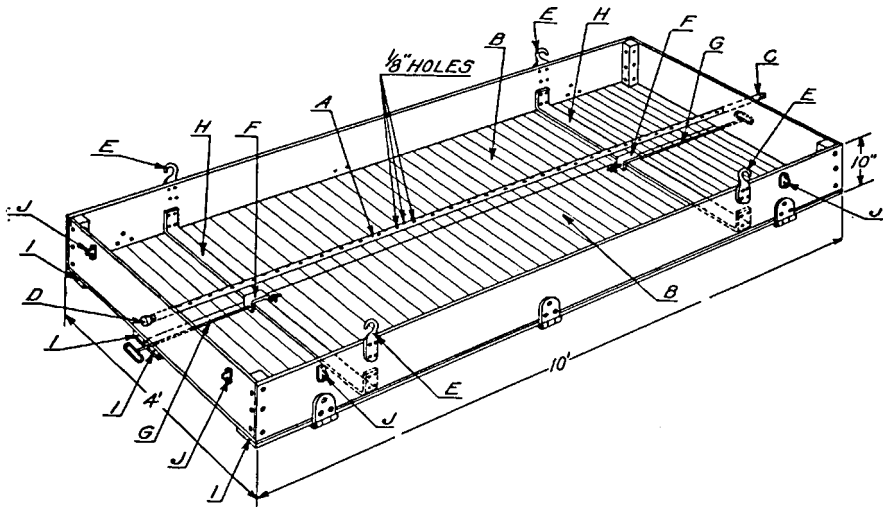


DIAGRAM OF CONSTRUCTION OF STEAM-BOX (TOP REMOVED)

A, ¾-inch pipe drilled stagger-fashion with ¼-inch holes; B, B, the two sections of the tongued-and-grooved bottom, hinged to the sides and opening in the middle; C, steam inlet; D, end of steam pipe, capped to permit cleaning out; E, E, E, E, hooks for attaching hoist; F, F, clamps to slip over ring holding bottom sections; G, G, pins to hold bottom while loading; H, H, ½-inch by 2-inch steel suspension rods on inside to keep box from bulging and to hold the bottom sections when loaded; I, I, I, I, ends of battens along the two edges of the two bottom sections (the center batten of one section being fitted with an overlapping steel plate for holding the other section); J, J, J, J, staples (2 on each end and side) for engaging clasps holding top.

Our slogan has always been at Miami Valley to give our members the best possible golf at the least cost, and we feel that our steamer has gone far to help us accomplish the desired results, and produce our weedless greens.

Growing and planting coniferous trees on the farm.—Farmers' Bulletin 1453 has recently been issued by the United States Department of Agriculture, under the above title, and may be obtained from the department on application. To golf clubs interested in the growing of coniferous trees (pines, spruces, firs, and the like), on their courses, the bulletin offers valuable suggestions as to the best choice of trees for the various sections of the country, collecting of seed, planting the seed and growing the seedlings in the nursery, transplanting the young trees, subsequent care, and underplanting of old stands of trees. Where trees are needed for immediate use it is of course recommended that they be purchased from a nursery, as the growing of such trees from seeds requires two to four years, depending on the kind of tree.

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

In tournament play, if the match is all-square at the end of the eighteen holes and one stroke handicap is given by one of the contestants to the other player, is it necessary to play nine holes to decide the match, or eighteen holes? Does the fact that the stroke falls in the first nine affect this in any way?

Decision.—It is customary to play the entire eighteen holes over again when a tie occurs in match-play handicap.

In tournament match play, if a player loses a ball and, after searching for it for five minutes, abandons the search, then drops a ball in the usual way, and plays that one, and while walking to the green finds the original ball that apparently was lost, what rule covers?

Decision.—After a player has searched for five minutes, the ball is considered lost and he must either give up the hole or return and play another ball as provided under Rule 22. A player may not under the rules play the original ball under the circumstances mentioned.

A is on the green, B is approaching the green from more than twenty yards distant. A removes the flag-stick as the ball is played. B claims the hole, on the ground that A has no right to move the flag-stick except for his own side. Rule 32 (1) reads as follows: "Either side is entitled to have the flag-stick removed when approaching the hole; if a player's ball strike the flag-stick, which has been so removed by himself, or his partner, or either of their caddies, his side shall lose the hole."

Decision.—A was entirely within his rights either to remove the flag-stick himself or have his caddie remove it when B was about to approach the hole. B's claim to the hole on the ground that A had no right to remove the flag-stick except for A's own side can not be sustained. Rule 32 covers this point specifically.

Has there been any change in the rule providing that when a ball is in a sandpit that the ball must remain exactly as it fell into the trap without the leveling of the sand surrounding the ball?

Decision.—There is no change in the rules regarding ball in hazard. The club may not be soled without being penalized as specified under the rules. You have probably confused the rule that allows a player who has played a shot from a hazard, when the ball still lies in the hazard to smooth over the spot from which the first shot was played, provided in doing so he does nothing to improve the lie of the ball for his subsequent shot.

A small creek runs along the left boundary of the fairway of the third hole of our course. It is played as a water hazard and a penalty stroke incurred for lifting out of the creek. Please advise as to whether a ball which has been lifted out of the creek should be dropped on the fairway or near side (this being the side on which the ball goes into the creek) or whether the ball must be dropped on the left or far side of the creek.

Decision.—The ball must be played as provided under Rule 27 unless your local committee rules that the position of the creek is such as to declare it a "parallel water hazard"; then it is permissible to drop the ball on the near side with a stroke penalty. It is usual to designate the boundary of parallel hazards by a line of white stakes.

QUESTIONS AND ANSWERS

All questions sent to the Green Section 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 Section.

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. Effect on ammonium sulfate of water of high lime content.—We are using a city water supply having about 22 grains hardness per gallon. Most of this hardness is due to lime and we are wondering whether this lime will offset the ammonium sulfate we are using. We have a power sprayer outfit capable of treating a green with ammonium sulfate in a very short time, and we are planning to so treat the greens every three weeks, using a light topdressing of compost and ammonium sulfate in between. We believe the statement has been made in THE BULLETIN that if ammonium sulfate were applied every week a soil such as found in this part of the country would be given a sufficient degree of acidity within one year. We are of course very anxious to eliminate clover in our greens and to be able to reduce weeding to a minimum. (Indiana.)

ANSWER.—Where there is lime in the water it necessarily slows up any process of acidifying the soil, but with the continued use of ammonium sulfate headway will nevertheless be made. It is impossible to tell in advance how long it will take to acidify a given soil to such a stage that white clover will disappear; but the progress being made in acidifying soils can well be watched by means of soil-testing outfits now on the market and which are not expensive. Apart from the question of acidifying your soil by the use of ammonium sulfate, the fertilizing value of the ammonium sulfate will not be decreased at all by the use of your water of high lime content.

2. Grasses for conditions of extreme dryness.—We should be glad to receive your suggestions for turf grasses for extremely dry conditions. We have found that buffalo grass appears to be one of the most suitable grasses under our conditions, but we can not find that seed of it is on the market. (Alberta.)

ANSWER.—The turf grasses of the prairie regions of Canada and the United States are buffalo grass and grama grass. Both of these are excellent for the fairways and rough on golf courses, and for lawns, but are not well adapted for putting greens. We do not know of any grasses adapted to putting greens that will thrive in the prairie regions unless they are irrigated. Seed of neither buffalo grass nor grama grass has ever been on the market and they must be propagated by transplanting, unless arrangements can be made for gathering seed in the field. Furthermore, seed of buffalo grass is usually very low in germination.

3. A clover green.—Would it in your opinion be practicable to attempt to grow all clover greens? We are advised that some very excellent greens in California have been obtained in this way. Our

reading of THE BULLETIN and our advice from experts have been to discourage clover wherever possible. In spite of our treatment we have one or two greens that run very strongly to clover, and we are wondering if it would not be wise to encourage them in this direction and try for a complete clover green. (Utah.)

ANSWER.—For the highest type of greens white clover is not a desirable plant. However, in regions where the soils are not acid and it is difficult to combat white clover, a good many clubs get along fairly well with putting greens made up of a mixture of bluegrass, redtop, and white clover. With good treatment these make fairly satisfactory greens, and where the soils tend to be rather strongly on the alkaline side it is perhaps wise to maintain such greens. A complete green of white clover however can not be secured. For some reason white clover will not maintain itself as a pure culture.

4. Fairway grasses for and treatment of sandy soil.—What grass would you advise for use for fairways on a very sandy soil? (Illinois.)

ANSWER.—If your sand is unusually poor it is almost impossible to get good turf. In such cases it is necessary to topdress the fairways, or at least their important parts, with a rather heavy loam. Frequent light topdressings should be made until you get a surface that will grow turf. It is well to add a little manure to the topdressing, not to exceed 25 percent. Very wonderful fairways have been made on sandy soil at the Pine Valley Golf Club, Clementon, New Jersey, in this manner. The plants that will give best results on sandy soil are bent grass and white clover.

5. Getting rid of moss.—On certain places of our course it is desirable to get rid of some moss and we have been told to lime the ground in order to sweeten it. Is it true that turf, particularly under trees, can be better cured of this trouble by fertilizing than by applying lime? (Connecticut.)

ANSWER.—Lime is not a cure for moss. Our experimental turf plots to which we have applied lime liberally have more moss than any other plots in the series. Good nitrogenous fertilizers will in most cases eliminate moss entirely or keep it decidedly in check.

6. Acidifying soil before planting.—We are building four new greens to be planted with bent stolons. Would we gain anything in the way of fertilizing and acidifying the soil of these greens by putting on ammonium sulfate in large quantities before planting? (Indiana.)

ANSWER.—You can save some time in acidifying your soil by applying ammonium sulfate to your putting greens before seed or grass is planted. We would suggest that you use at least 10 pounds to 1,000 square feet and mix it thoroughly in the top two inches of the soil, and then water thoroughly.

7. Use of creeping bent stolons from nurseries that are producing seed.—We are planning to use stolons from a creeping bent nursery planted last summer and which is now going to seed. Is the material too old for the purpose? (Massachusetts.)

ANSWER.—Information on this subject is given in THE BULLETIN, Vol. IV, pages 163 and 206. The evidence indicates that stolons from an old nursery may be used successfully but that they will need to be planted more thickly than in the case of stolons from a young nursery.

MR. GREEN-COMMITTEE CHAIRMAN:

Various methods have been suggested for the use of bichlorid and other chemicals against brown-patch.

Frequently we are asked to state the best method for applying such chemicals to greens.

This problem is like that of passing judgment on whether eggs are best when boiled, fried, scrambled, poached, or otherwise; it all depends on who is to eat them.

The best method for applying chemicals to greens depends largely on available equipment, condition of the turf, and other local circumstances; above all, on the choice of the greenkeeper.

For those greenkeepers (may their tribe increase) who topdress frequently and prefer to apply their fertilizer and bichlorid either with the heavy topdressing or with just sufficient compost to give bulk enough to spread easily, this method is best—if the application is uniform.

For those who are firm believers in proportioning machines (and can make them work) this method is best—if the application is uniform.

For those who swear by the barrel-sprinkler device, or the good old-fashioned sprinkling can, this method is best—if the application is uniform.

For those who choose elaborate spray squipment, this method is best—if the application is uniform.

For those (their ranks are growing thin) who are ever ready to argue in the cause of dust-guns, this method is best—if the application is uniform.

The important thing is to put the material on evenly, so that all parts are equally protected without any excess in spots to produce "burning."

In other words, quibbling about methods of application does not control brown-patch.

We know the fungus and grass have no preference as to method; but many greenkeepers are most decided, and frequently vociferous, in their preference.

We have tried them all. Each method has its advantages and disadvantages; but if properly used, any of the above will give good results.

The wise greenkeeper will use more than one method and will be able to choose that which at a particular time best suits his requirements.

THE GREEN SECTION.