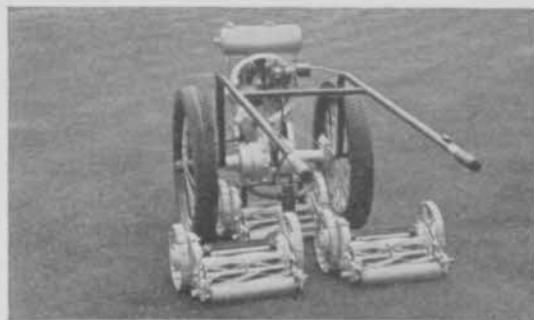


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The Worthington "Overgreen"
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The "Overgreen" is a power putting green mower offered as a perfected achievement after the most exhaustive tests possible. It is a complete tractor drawing a complete gang mower composed of three 13-inch cutting units. It will cut a green in one-third the time required by a hand machine.

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Here is the quarter acre of plots, each 10 ft. by 10 ft., at Riverton, N. J., where considerable research with grubs has been, and is being, conducted.

How to Handle Fairways in Battle with Grubs

By B. R. LEACH

FAIRWAYS are a necessary evil as far as the average golf club is concerned.

You cannot do without them in the game of golf and yet even the cost of keeping them mowed is an important item in golf course maintenance. The attitude of green-committees and club officials in general toward fairways, and especially their attitude on the spending of money for fairway betterment or insurance, was made very clear to me in the early days of the difficulty with the Japanese beetle grub. At that time the greens on several clubs in the vicinity of Riverton were looking pretty seedy as a result of the grubs present in the turf. I gathered from the remarks of certain passing female golfers that it was entirely impossible to putt on the blankety-blank greens, that the green-keeper ought to be boiled in oil, and that the green-chairman was no gentleman. Not one word about the fairways, which to put it mildly were atrocious.

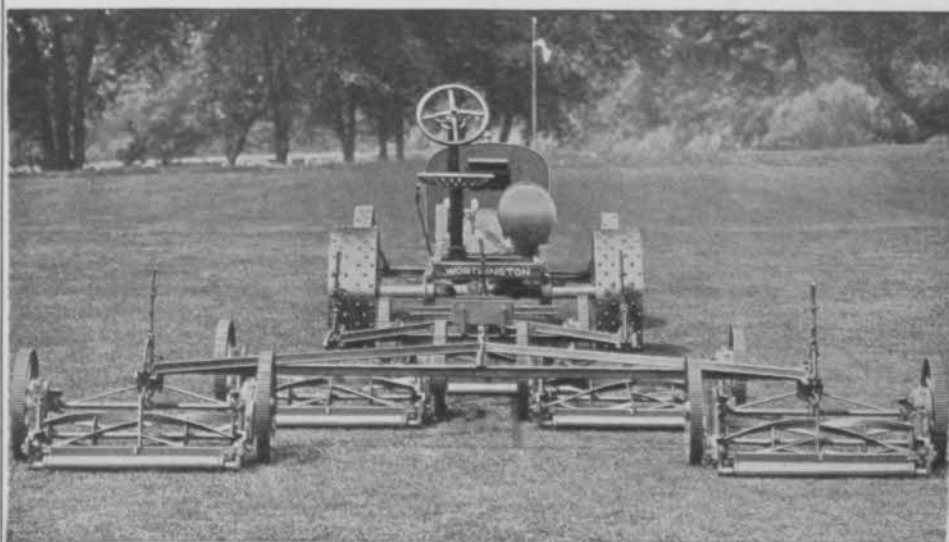
From what I have seen of the average golfer it would appear that his thoughts are centered on the greens. If these are first class, so that the ball stays put when

lifted onto the green with a niblick, and the putting can be accomplished with the usual aplomb, you will get only an occasional and half-hearted growl about the condition of the fairways. But let the greens go bad, regardless of why they went bad, and the club membership hits the ceiling.

It is not surprising, therefore, that the officials of the clubs mentioned above begged me to concentrate on saving the greens. As the president of one club said, "Our greens are in bad shape as a result of this grub. Unless we can get them back into shape very shortly we will lose a large proportion of our members and the club will be in a bad way financially."

Under the circumstances it is to be expected that the average green-committee will rarely wax enthusiastic on a proposal to spend much money on the fairways while they will invariably endorse any plan which promises to improve the greens. Aside from the relative importance of greens and fairways in the minds of officials and players, there is another reason for the general apathy toward fairway im-

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Whenever a smaller swath is desired the two rear units may be disconnected by means of a single bolt and the cutting operation continued with the triple machine.

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provement and that is the item of expense. It doesn't cost so much, comparatively, to carry out a new scheme on the greens but to do the same thing on the fairways runs into real money. There are two or three acres of greens on the average 18-hole course as compared with 60-odd acres of fairway.

As a result, the fairways in the average golf course are more or less neglected and most of them show it plainly. They are mowed religiously and once in a great while some grass seed is scattered over them. As a matter of fact, you might as well throw the grass seed over a cliff for all the good it does.

While, therefore, the use of arsenate of lead as a means of grubproofing greens is constantly on the increase in all sections of the country, I do not expect to see its use extended so rapidly in connection with fairways. If my experience around Philadelphia is any criterion, I do not expect to see the average club grubproof its fairways until they are virtually ruined by grubs and the bare soil in danger of being washed into the nearest creek. That this is poor business is obvious when you consider that the 250 pounds of arsenate of lead necessary to grubproof an acre of fairway can be bought for about \$35, whereas if you delay the grubproofing until the fairways are ruined, you will not only have to spend this \$35 an acre but also at least an equivalent amount for grass seed.

Hand-Spreading Impractical

When applying arsenate of lead to fairways, in view of the acreage involved, do not spread by hand; to do so will run up the labor cost to a prohibitive figure. It is much better to obtain the use of a first class lime or fertilizer spreader, one that covers an appreciable strip for each trip across the fairway and can be drawn by a tractor or horses. Unfortunately many of these machines are built and designed to deposit the material upon the turf in drills running parallel and spaced a few inches apart. This may be entirely permissible with lime or fertilizer but it will not prove satisfactory when spreading arsenate of lead. Therefore, when using a spreader of this type for fairway grubproofing, fix one or two baffle boards below the openings through which the material pours out from the box, arranging them on an angle so that the streams of arsenate hit them and are broken up before they reach the ground, resulting in an even spread all over the turf. It is also a good plan to

fasten some heavy burlap bags along the sides of the box, front and rear so as to prevent largely the tendency of the arsenate to blow about.

All these spreading machines have differently designed holding and feeding capacity but all are capable of being regulated so as to spread dry, evenly screened material with a remarkable degree of accuracy if a little care is taken. In regulating and adjusting the machine it is best to gauge the amount spread over a long, narrow area of turf rather than over a short, wide one necessitating many turns, and it is best to do the regulating with plain screened soil or sand containing no arsenate of lead. Remember in using these machines that the wheels extend out beyond the box and it is necessary to lap over the wheel marks somewhat so as to leave no untreated area.

After the arsenate has been distributed by machine, it is advisable to run a spike-toothed or diamond-pointed alfalfa harrow both ways across the turf so as to harrow in the arsenate of lead lightly without digging up the grass. Do this harrowing as soon as possible after the fairway is arsenated; there is less chance of surface soil-washing as a result of a heavy rain, with the consequent carrying of the arsenate into the low spots.

Preparing Arsenate for Spreading

Do not spread the arsenate over the fairways without first mixing it with dry filler such as finely screened soil or sand—first, because 250 pounds of arsenate of lead is a relatively small bulk of material to be distributed evenly over an acre of ground, and second, because the material, a light fluffy powder, blows about at the slightest puff of wind. Hence it will be found advisable to mix the arsenate with a quantity of dry soil or sand, first to give added bulk so that the machine may function at its best and secondly because the arsenate will tend to cling to the particles of soil or sand and when the mixture strikes the turf it will filter down through the blades of grass and have decidedly less tendency to cling to them. The main idea when this job is completed is to have the arsenate *on the fairway*. The portion of the arsenate which blows over on the rough won't do a bit of good.

Filler for arsenate of lead when the mixture is to be spread by machinery should be dry; otherwise there will be endless trouble and uneven distribution due to clogging.

Ed. Dearie, Jr.,

*Greenskeeper
Ridgemoor Country Club*

*Supervising Greenskeeper
Twin Orchards Country Club
Big Oaks Country Club
River Forest Golf Club
Chicago, Ill.*



says of NU-GREEN:

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Nu-Green comes ready for use. It is easily and quickly applied.

Dr. J. J. Monteith, Jr., in the December, 1927, issue of the Bulletin of the U. S. Golf Assn. Green Section, says of NU-GREEN:

"The areas treated with Nu-Green soon developed a luxuriant, dark, healthy green color, which stood out in sharp contrast to the untreated portion, where the turf retained the pale yellowish cast so common on many greens. In cases, these plots were so striking that they became a source of wonder and amazement to greenskeepers, professionals, club officials, and players."



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25 lb. size	\$1.45 per lb.
50 lb. size	\$1.40 per lb.
100 lb. size	\$1.40 per lb.

NU-GREEN

Controls Brown-Patch

THE BAYER COMPANY, INC.
Agricultural Dept. 117 Hudson St., N. Y. CITY

I am frequently asked regarding the feasibility of spraying the arsenate onto the greens and fairways, using a sprayer such as is employed for truck crops, and I understand that some greenkeepers are contemplating trying out this method. Personally, I do not consider the spraying of arsenate upon turf an advisable procedure. Grubproofing dosages are relatively heavy and the arsenate sprayed in this way will have a greater tendency to stick to the blades of grass; a pronounced burning may result.

In mixing dry soil or sand with arsenate of lead in preparation for spreading by machine brains must be used to a certain extent, even though that unusual procedure may cause undue mental exhaustion and pain. Do not throw the sand or soil in a pyramidal heap, throw the arsenate on the top of the heap, and then make a few half-hearted stabs at the pile with a shovel. Proceed, on the contrary, as follows: Spread out the dry soil or sand on a smooth, hard-surfaced floor, making the layer a few inches thick depending upon the amount of arsenate and soil you are mixing at one batch. Now spread the arsenate evenly over the layer of soil and using a scoop or flat shovel, dig into the composite layer of soil and lead arsenate, keeping the shovel in contact with the floor. Throw the shovelful in a heap at a convenient point on the floor, employing a twisting motion with the wrist so as to mix the arsenate and soil together as much as possible when the heterogeneous mass pours from the shovel. Take another shovelful in the same way and pour it *on top* of the first. Proceed and you will note that the pile assumes a cone shape and that each shovelful so added to the peak of the cone *runs down the sides of the cone*, resulting in a decided degree of mixing for the amount of labor expended. Continue until the layer on the floor has been entirely transferred to the pile. The mixing job is now half done. Now dig into the pile *from the bottom* with the shovel scraping the floor and throw the shovelful in a heap for the beginning of a new cone-shaped pile. Take each succeeding shovelful from the *bottom* of the old pile and throw it on the *top* of the new one. When you have built the second pile in this fashion, the soil and arsenate should be well mixed and in a condition suitable for the spreading machine. Incidentally, the individual doing the mixing will be in a general state of mental decrepitude.

When to Grubproof Fairways

If grubs are present in the fairways and it appears that the latter are in danger of injury, apply the arsenate at once regardless of the season of the year, providing the ground is not frozen. If grubs are not present in the fairways but the latter are to be grubproofed as an insurance against grub attack, the material is best applied early in June, since the great bulk of egg-laying by beetles occurs after this period and the turf will then be in such a condition that the young grubs hatching from the eggs will be poisoned almost immediately by the arsenate in the soil.

Maintaining Grubproof Fairways

Two hundred and fifty pounds of arsenate of lead should maintain a fairway in a grubproof condition for two years except possibly on slopes where there is a tendency for the surface soil to wash. After the first year, keep an eye on the turf for earthworm casts. If these become sufficiently numerous to be noticeable, it is an indication that the grubproof condition of the turf is becoming weakened and it is advisable to apply around 100 pounds of arsenate per acre in order to maintain the grubproof condition.

It is only fair to the reader to state at this point that my experience with fairway grubproofing only covers a period of two years, whereas I have been working with greens for six years. That arsenate of lead will grubproof fairways is an established fact, but how long a given amount of the chemical per acre will maintain the grubproof condition I cannot say. This can only be determined by the continued observation for some time to come of fairways arsenated during the past year or two.

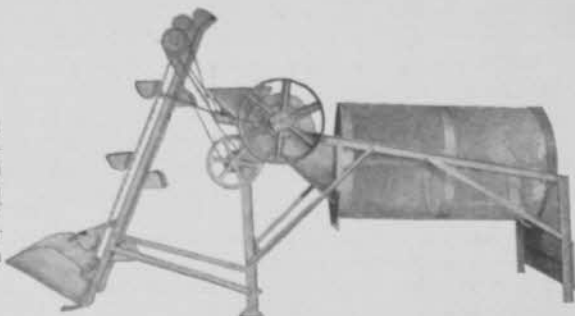
Many greenkeepers, when planning to grubproof fairways as above, will raise the question as to whether they can mix and apply fertilizers with the arsenate of lead, all in one operation. The answer depends entirely upon just what fertilizers you propose to use. Rotted manure or mushroom soil, ammonium sulfate, synthetic urea, and such organic fertilizers as Milorganite, cottonseed meal, etc., are entirely permissible in this connection but I do not advise the use of ammonium phosphate, acid phosphate, the chloride or sulfate of potash or sodium nitrate. The latter series of compounds react with arsenate of lead and tend to lower its grubproofing properties, although the vigor of the grass is not affected thereby.

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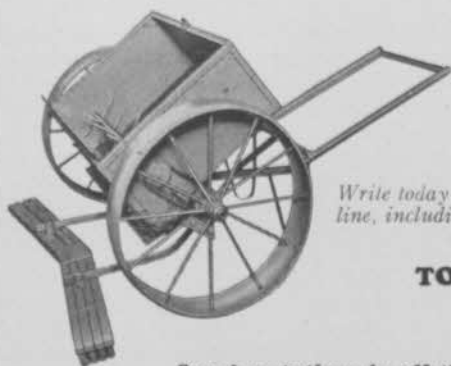
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Consider Organic Matter in Soil for Healthy Turf

By AUSTIN K. CHENOWETH

TO THE man concerned in golf course construction and maintenance, it would be interesting to know how many of our golf organizations have had an uphill fight in acquiring first-class turf. This is because the topography and the price of golf land have been considered more important by purchasers than its natural ability to produce economically even fair golfing turf.

Hundreds of golf clubs in the United States are suffering today from such near-sighted selection. If we were to choose our professional golfer from the rural ranks because of his natural, physical beauty and ruggedness, and attempt within a few years to make him a fine example of a golfing mechanism, the cases would be almost parallel.

A farm physically fit to grow golf turf rarely found on the market at an interesting price. If the property has been an intensive producer of any of the farm crops it has been such because of scientific handling for many years with heavy expenditure for drainage and close attention to crop rotation. Each acre, because of the manure applied and the dead and decaying vegetation turned under, has become as "mellow" and friable as grandfather's garden.

For golf purposes we select, for topographical reasons, the more rolling lands, from whose slopes, for ages past, any organic matter which might have been produced through the decay of vegetation, has been washed into the valleys below, leaving behind a soil but little different in physical condition from its original form of finely powdered rock. We hardly realize we are trying to grow on such land, probably the most intensive of crops, that of splendid fairways and putting greens. Every grain of this soil must be highly operative. We are satisfied only with a mat of turf so thick that it is next to impossible to separate the growing shoots and find the earth below.

The turf is, in itself, a tremendous feeder and user of moisture. Each green, of ordinary size, consumes daily an amount of feeding many times more than if the

same area were devoted to the average farm crop and often evaporates as high as a ton of water. Because of its congested growth, it is liable to every affliction that turf is heir to. Every square inch is in high speed at all times. There is no sign "keep off the grass" as would be given its weaker sister, the park or lawn.

The most cursory examination of a known fertile soil shows that it is, at all times, "mellow." Its soil particles have been separated by minute particles of organic matter which permanently keep them apart. If worked by plow or shovel, on the application of this pressure, it immediately fractures into many very small units because of these separating particles.

On the contrary, in a soil deficient in organic matter, the soil particles cling together and we have, upon turning, clods which are broken up with great difficulty. Should a soil, carrying the requisite amount of organic matter, contract on drying, it will fracture evenly and at once become porous, due to the shrinkage in the organic matter. These fractures are fine enough to create a dust mulch, giving protection against two rapid evaporation of soil moistures at the surface.

Rain or sprinkling, to replace lost moisture, will at once penetrate this soil, and because of the ability of organic matter to retain moisture, it is held against the day when surface evaporation shall call for it through capillarity to replace the moisture lost either through direct evaporation from the soil or from plant life upon it.

A soil deficient in organic matter and subject to such drying conditions will because of its tenacious character, fracture into several large cracks, which remain open and permit rapid loss of moisture. This loss is, unfortunately, largely from the soil lying below the roots of the plant life. Such soil has not been productive as farm land, yet frequently becomes the property on which we lavish our time and money in an effort to produce that most wonderful crop, good golfing turf.

Organic matter, then, must provide a friable, porous soil easily admitting large quantities of moisture and considerable

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Power Putting Green Mowers!



THROUGHOUT America, Jacobsen Power Putting Green Mowers have met every requirement of the most exacting greenskeepers, and with the unqualified approval of "Pros." Read the two letters reproduced here.

The mowers are made in two sizes—19 inch and 24 inch cutting reels. They produce a finer cut than any push type mower. All major castings being made of Aeroplane aluminum and the weight distributed over the large traction rollers, the delicate cushion of the green is not affected. Constructed with the fineness of an automobile—differential gears enclosed and running in oil, separate control of traction and cutting unit, self-sharpening reel and other exclusive Jacobsen features.

Investigate—write for literature and list of users. Demonstrations on your own greens, without obligation.

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The
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New York Office:
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Willow Beach Country Club Little Rock, Ark.

Gentlemen:

In regard to the mower I think it the best part of our equipment and not only that, but it has saved us \$2.00 per day every day we mow.

As far as cutting the greens it does the work better than we could do with 10 hand mowers. I think every course should have one or two of them and I am talking to all of the other Professionals here and I think they will be ready for one in the Spring.

If there is anything I can do for you in this State please do not fail to call on me for I am sold on the Mower and am showing it to everyone who has never seen one work.

Yours very truly,

J. ACKERBLOOM, Pro.

Elks Country Club Worthington, Ohio

Dear Sirs:

We bought one of your Power Putting Green Mowers, 19" size this last fall and cut our Greens six or eight weeks with it. At the same time we laid off six of our greensmen. I put one man on the Power Mower and he cut all of the greens the balance of the growing season. We saved enough money in the time these men were off to pay for the machine besides a better job of cutting on the greens. Members would ask every day what was making the greens so much better.

I think we will do all of our cutting next year by power by using your Heavy Duty Machine for approaches, tees, rough around the greens, and the Power Mower on the greens.

Yours very truly,

LAWRENCE HUBER, Greenskeeper.

air. This, however, is but a part of its value. All plant food material, before it is absorbed by the roots, must be prepared by the digestive soil bacteria and made soluble in the soil moisture. It then can pass into the plant as the rootage takes moisture. These soil bacteria can best live, multiply and operate as they should, in a medium such as well-decayed vegetable matter provides.

It matters but little how much food we have made available for the human body if we have not the power of digestion and the assimilation of this food. So with our soils. It is very infrequent for a soil to be found which is actually deficient in any of the three primary feedings known to be necessary for plant life, unless such a soil is deficient in organic matter; rather, the most common finding is a lack of ability on the part of the soil to use the abundant feedings which are at hand, because of the failure of digestive power through a proper soil bacteria. Due to want of organic matter, an increase in the number of digestive organisms is not encouraged, insufficient feedings are provided and a partial starvation of plant-life results. Very frequently, rather than additional plant food, cathartics are indicated, were it possible to administer such to the soil.

Organic matter suitable for golf turf production may mean any decayed vegetable matter, provided the decay is well advanced. Leaves, wood, manure and even weeds are satisfactory for construction and maintenance, if so handled as to allow them to break down after several years of exposure to moisture and plenty of air, so that their eventual fineness will not exceed one-tenth of an inch in diameter. This is important; unless these materials are in an advanced stage of decay, they will not have the power of increasing or decreasing their volume, as moisture is added or removed, nor will they have the fineness to create the proper mechanical separation of soil particles. Any decayed vegetation, if allowed to gain this fineness, will have approximately the amount of feeding elements of a well rotted horse-manure. In the compost pile, we merely create well-decomposed organic matter charged with the nitrifying organisms of the manure; the greater value lies in the degree of ultimate fineness of the organic matter which it may contain.

A fertile, porous bit of farm land must of necessity have no less than 40,000 pounds of organic matter in its top twelve

inches of soil per acre; this amount may be doubled to advantage in our fairways. In green-construction, because of the character of vegetation to be produced, the amount of organic matter used must be materially increased. This amount will vary because of a natural organic content in the soil; but whatever organic additions are made, it should be made if possible at the time of original construction by complete incorporation with the top twelve inches of the soil.

The quantity must vary from ten to twenty-five tons per green. Well-decomposed organic matter has the power of absorbing 85 per cent of its weight in water and increasing its volume more than 100 per cent when wet. When added to the green at the time of construction, it creates a reservoir of water in the green which only protracted drought can exhaust.

Compost containing manure and sod in varying quantities, if well worked in, should contain organic matter in sufficient quantity to make a splendid top-dressing. It would, however, hardly contain sufficient organic matter for green construction unless used as taken from the compost pile and without further admixture of earth. A commercial humus is the common source of organic matter; its value depends upon its fineness, due to advanced decay, and to its organic purity. A commercial humus taken from a wet, undrained, uncultivated land may be but partly decayed, and may throw off toxic conditions. It is rarely fine enough to provide proper porosity and friability, or "mellowness" of the soil.

If proper organic matter is not available, sand is frequently employed in golf soils to create porous conditions for late fall dressing, it is questionable whether it can take the place of organic matter in the preparation of beds either for seeding or for planting by the vegetative method. If an equal mixture of sand and very fine organic matter be placed upon a hard clay soil as a top-dressing, it will be found within a year that the organic matter has penetrated the soil to a greater depth than the sand, due to its partial suspension in the water applied to the green, and the downward pull which gravity exerts upon this fine, thoroughly-wet, cellular matter. Sand cannot have the power of absorbing and retaining moisture nor of contracting as moisture is removed. Porosity, from the use of sand is limited. Irregular and un-