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For golf course treatment adjoining the clubhouse open lawns with partial enclosures no doubt would be in order whilst shade trees ought to be considered for shade and conifers for wind protectors. Shrubbery groups may enclose the lawn, in some instances defined hedges or ornamental fences. On the inside of the enclosures perennials may be planted for border effect. Perennials could be set out at the hedge of shrubbery whilst hardy spring flowering bulbs have special value for this purpose. Out in the open borders and beds would likely be out of place for the former; a background is wise, whilst an enclosure is needed for flower beds. This latter means a formal effect where statuary and garden furniture of suitable design may be featured. Paths leading from one division to another of the garden could be of grass and in some instances flat stones. Cement is used a great deal but can often be substituted except perhaps for the main paths. Stepping stones and crazy paths are very popular, so are tile where the buildings are of brick. Pergolas and archways could be part of the scheme in connecting sections or divisions or at entrances. These structures need climbers to cover them in part. Climbing roses, Wisterias, Clematis and Honeysuckle are tip top for this purpose. Rustic archways for a woodland theme may be successfully brought about.

Every setting is different and varied schemes may be much in order. It is a

matter of enriching the site and buildings with floral and arboreal beauty. To do this unity must prevail which means that pleasing effects, harmony and balance must be paramount. In other words good common sense with artistic taste must be the keynote. Overcrowding and shutting out objects of beauty and interest must be avoided. Vistas may be created to extend and feature wonderful views. The course should be an integral part of the existing landscape, yet different. It should be beautiful and of decided character.

Nursery Is Adjunct.

Planting around the clubhouse and golf course generally means that planting material is needed from time to time, thus a nursery would be in order. This may be brought about without a great deal of trouble. An acre or so of land would be required if a large number of specimens are likely to be required, but only a few square rods if just a few shrubs and trees are likely to be all the requirements.

In the first place many trees, conifers, shrubs and perennials may be raised from seed, others by way of twigs and shoots. All native stock may be procured from seed sown in the fall or spring. The best thing to do is to think of the system followed by nature and act accordingly. For example, most seeds and fruits fall to the ground, become covered with leaves and so on; later germination and growth come about. Leafy and sandy soil will do as a

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Consulting Engineer

slight covering. The seed bed soil should be at least comparatively fine and fertile. Some use enclosed beds, others rows and sow seed not too thick and not too deep. Seed, berries or nuts should be covered over about twice their circumference deep. The top soil itself should be loose. Sand and fine earth are admirable for this, but the seeds are better if lightly packed. Conifers or evergreens are better if slightly shaded and cheese cloth tacked over the sashes is splendid. Although laths wired together about $1\frac{1}{4}$ to 2 inches apart are used a great deal.

The majority of perennials grow well from seed either sown in spring or about July or early August. Dividing of perennials may be easily done. The early flowering kinds are best done fairly soon after blossoming is over whilst with the late flowering forms, spring is the best time usually.

Varieties of shrubs far removed from the original species do not always come true from seed and so an artificial method of perpetuation must be followed. This is why the vegetative, asexual or cutting systems are made use of.

In the fall or early winter the use of matured wood for propagation work is popular and gives wonderful results. Most shrubs may be handled in this fashion. The recent year's growth, or even older, will respond quite well. Shoots or twigs cut into lengths of about 6 to 8 inches are the usual thing but these are cut just below the bud at the base or larger end of the shoot and at the reverse end or top, the cut is made just above the bud. Following this the cut twigs or shoots, usually

called cuttings by propagators, may be set out of doors in trenches and placed well down from half to three-fourths their length and the soil well firmed around them. In very cold spots in clay sections if the work be done quite late in the winter these cuttings may be tied in bundles, covered with soil or sand or leaves and placed in a cool cellar or shed or in a sheltered place outside. Cuttings must not be allowed to become dry. In spring the bundles must be untied and the cuttings planted singly out-of-doors in rows as already described. During summer frequent cultivation is wise to aid rooting conditions in the soil and to control weeds.

GREENKEEPING PROBLEMS

in

LEACH'S MAIL BAG

June Bug Control.

Dear Mr. Leach:

We have been sufferers on our course from the June bug for a number of years, having had a rather severe infestation last year resulting in a grubbing up of the fairways to a considerable extent. The soil here in Kentucky is a rather heavy clay variety and may be difficult to penetrate.

We have, however, decided to try the arsenate of lead treatment and intend using it both on the greens and fairways.

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We have a somewhat peculiar situation in that several years ago an addition to the course was made and on the new part we have no infestation of the bugs, but the old fairway is badly infected. We therefore intend using the arsenate of lead both on the greens and fairways of that part of the course showing infestation.

I have made a rough estimate of the amount of arsenate of lead required and figure that we will require about five tons, using 250 pounds to an acre. How much milorganite will be required to dilute the 250 pounds per acre?

In order to repair the damage done by the grubs last year we thought we would use a chemical fertilizer and resow the fairways along in February or March, according to the season, and use the arsenate of lead treatment some time between the 1st and 15th of June, anticipating the appearance of the beetles.

I would like to have your opinion regarding this plan about the early fertilizing and seeding of the course with the later application of the arsenate of lead and milorganite.

G. C. H. (Kentucky).

Reply.

The infestation of the older portion of

your course and the lack of infestation of the new portion of the course may be due to a difference in the organic matter or rather the degree of organic matter present in the two portions of the course. As a general rule the June beetle grub prefers soil in which the organic content is high. For this reason, in the south, June beetle grubs frequently become serious when manure is applied to the fairways and greens. They are always the worst on the greens and approaches where the soil contains an abundance of organic matter. I do not of course infer from this that manure should not be used on turf. Far from it. Use the manure and hold the grubs by chemical means.

For use as a filler with lead arsenate, milorganite may be used at the rate of one pound of the arsenate to 3 pounds of milorganite if you can arrange to spread the mixture on quiet days when blowing is at the minimum. Otherwise I would mix one pound of lead arsenate with 5 pounds of milorganite.

The use of a good chemical fertilizer in early spring on this damaged turf would be good business as well as the grub-proofing application in early June or as soon as the beetles appear. Would suggest that

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you hold off on the seeding until fall. The spring application of fertilizer will give a decided impetus to the grass now remaining on the fairways and the lead arsenate application will hold the crabgrass down and give the fine turf grasses a chance to fill in all during the growing season. By fall you may find that you have a pretty good fairway after all, so that maybe a bit of seeding here and there will round out the job.

B. R. Leach.

"Raincoats" for Greens.

Dear Mr. Leach:

It has been called to our attention that some of the clubs in the east have been using waterproof canvas covers to throw over their greens from time to time to prevent excessive moisture during heavy rains, as an aid to the control of brown-patch. I saw a newspaper article to this effect some time ago, but I am not able to locate it at the present time. If you have any information, as to the benefits to be derived from such procedure, I would be very glad to hear from you.

N. E. E. (Georgia).

Reply.

This idea, like many others of the same apparent simplicity, is a whole heap sim-

pler in theory than in practice. Covers are costly and you would find in practice that most of the rain had already fallen before the covers could be put in place. Just about as many rain storms begin after dark as during daylight. If it begins to rain at 2 a. m. how are you going to get your help on the job to put the covers in place? If on the other hand, you cover the greens every night, you'll have more trouble with disease than ever, for covering in this way will effectively prevent the night cooling of the soil surface.

B. R. Leach.

Bent Won't Grow.

Dear Mr. Leach:

Our grounds are in a creek valley and adjacent bluffs, the valley soil being a water-deposited silt, the bluffs a clay, both underlaid with gravel at a depth of four to six feet. Our greens were made by plowing up the soil, cultivating, and adding thereto ten tons of humus per green.

This humus is claimed by many to be a wind-blown peat. It is fine in texture, very black, holds about 120 per cent of its weight in moisture, makes a friable soil. When left on the ground, it kills the grass, and when left in piles does not support

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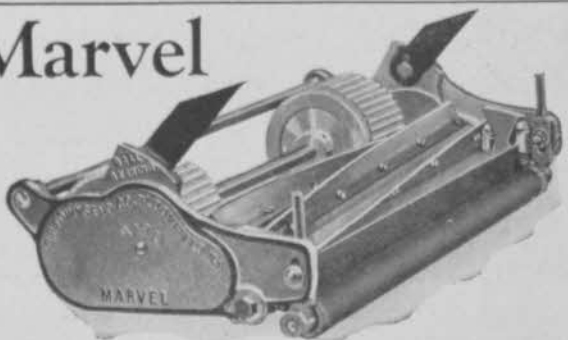
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weed or grass growth, even after two years.

We did no fertilizing of any kind. Stolens were planted and top-dressed with a mixture of soil and humus, but the grass on these greens has never made a satisfactory growth.

Top-dressing was done with heavy applications of bottom-land silt, following each of which the grass would practically stop growing, partially lose color, after which the top-dressing would pack hard as a stable floor and finally show a weak, scanty growth of grass.

Investigation of the greens last summer showed almost an inch of fine silt on top, waterproof, slippery when wet. We decided sand was a remedy, but repeated spike-rolling with sand top-dressing gave only temporary results, for the appetite of the silt for sand seemed insatiable.

I have been forced to the opinion that our bent cannot be made into a satisfactory turf; accordingly we are about to rebuild our greens. Do you consider it practical to attempt stolon planting early next spring? What fertilizing materials would you add to the soil? Manure is not available, but a reasonable amount of organic matter can be secured. Do you prefer an 8-4-3 mixture, milorganite, or in a 5,000 ft. green would you favor 40 lbs. of 40 per cent phosphate, 10 lbs. of muriate of potash and 50 lbs. of ammonium sulphate, with about 100 lbs. of cotton-seed meal?

L. B. G. (Missouri).

Reply.

Bent grass is bent grass and regardless of the particular strain it will produce a thick, putting green surface provided soil conditions are correct and the turf is properly handled. Whether the particular strain you now have is the best for your local conditions can only be determined by testing it alongside of other strains under your local conditions. The point I wish to make clear is simply that the grass itself is not to blame.

Silts and clays require expert handling when fine turf is grown in them for the reason that they are very "tight" soil types, drain, slowly, become greasy when wet and have a pronounced tendency to bake when drying out. Bent grass is unable to endure such adverse soil conditions and fails to thicken up. In other words these tight soil types simply choke the closely mown bent.

In addition to tight soil types there has been an unwise use of large quantities of

humus. Inasmuch as most of this bog humus is sour and fails to support plant life even after long periods of weathering it has no place in the soil of a golf green.

To summarize the situation you have a tight soil, not naturally suited to the growth of bent grass, and this soil has been rendered sour and toxic by the addition of the humus.

Under the circumstances would make the following suggestions as regards the treatment of the green which you propose to rebuild early this spring: select a time when the soil is not wet and sticky, and cut up the soil of the green thoroughly with a disc harrow. At this stage of the proceedings contour the green so that there are no hollow spots to gather surface water; surface drainage is very important in soil types such as yours.

Now apply ground limestone (not hydrated lime) at the rate of 75 lbs. per 1,000 sq. ft. of soil surface and work it into the soil to a depth of three inches with a disc harrow followed by a tooth harrow. Next, plow the soil to a depth of six inches followed by the disc harrow. Now apply another dose of 75 lbs. of ground limestone per 1,000 sq. ft. of surface and work this in to a depth of three inches with the disc harrow and the tooth harrow. If you can obtain some well-rotted manure and work in a fair amount of this (not too heavy an application) along with the second dose of lime, so much the better. Now smooth off the green with a smoothing harrow and be sure there are no hollow spots to hold surface water. If you have sand available cover the green with half an inch of sand and scratch it into the surface of the soil to a depth of one inch with a tooth harrow; don't go deeper than one inch.

In explanation of the above procedure, would advise that the lime will gradually correct the undue sourness of the soil caused by the humus and will also loosen up the stiff silt and clay soil, thereby giving you good soil drainage and prevent the surface-baking of the soil. If you can use the sand in the upper inch layer so much the better in that the results will be obtained more quickly.

When you are ready to plant the stolons loosen up the surface soil by just barely scratching it with a tooth harrow, spread the stolons on the surface and cover with the following mixture: 70 per cent sand, 20 per cent silt soil and 10 per cent rotted manure.

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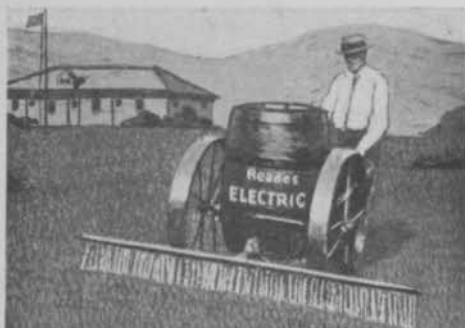
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All future topdressing of the green should be made using this mixture. In spring, midsummer and fall apply 5 lbs. of ground limestone per 1,000 sq. ft. of surface or a total of 15 lbs. for the season.

As regards the application of fertilizers, use milorganite or a mixture of milorganite and cottonseed meal. Suggest you write the manufacturers of milorganite for the latest advice on the use of their material; go easy on the application of this sort of fertilizer during hot weather.

Would also make the following suggestion: take the best green you now have and top-dress it throughout the present year with the above top-dressing mixture and after each top-dressing apply 10 lbs. of ground limestone per 1,000 square feet of surface. It would prove an interesting experiment to see just how much improvement you could make in such a sour green by the consistent application of proper top-dressing mixture and lime.

Rotted manure is practically indispensable in the growing of fine turf. If not available locally would suggest the purchase of mushroom soil (this is a mixture of rotted manure and soil). It can be obtained through any of the golf course supply houses.

B. R. Leach.

Hickory Shaft Men and Club Makers Set Standard

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