LAWNS

SUTTON & SONS
READING

Garden Lawns
Tennis Lawns
Croquet Grounds
Putting Greens
Cricket Grounds
Bowling Greens

By Sutton & Sons
Reading

Thirteenth
Edition

2/6

LONDON
SIMPKIN, MARSHALL, HAMILTON, KENT & Co., Ltd.
1920

BY APPOINTMENT

SUTTON & SONS

TURF SPECIALISTS

READING

CONTENTS

LAWNS

LAWNS

A SMOOTH and verdant lawn is a constant source of pleasure and it enhances the charm of every flower and shrub in the garden. Lawns are also most delightful meeting-places for social gatherings in high summer, and they afford opportunities for healthy recreation in the popular games of bowls, croquet, and tennis. Here, however, we are not concerned with questions of beauty or utility. Our object is to suggest the best and least expensive method of producing a fine, dense, elastic sward, and the means by which the grass may be maintained in good condition.

Lawns are made by laying turf or sowing seed. For the former it may be claimed that the ground is at once covered with grass, and the lawn is sometimes ready for use in rather less time than when seed is sown.

The labour involved in levelling the land and preparing a suitable surface is substantially the same, whether it is intended to lay turf or sow seeds.

Objections to turf are so numerous and important that experienced men now regard the use of it as obsolete, except under specially favourable conditions. Very seldom is it possible to obtain at a reasonable price turf that is at all fit for the purpose. The herbage of meadows or pastures consists of strong-growing grasses and clovers entirely unsuited for the formation of a fine ornamental sward. And too often the turf from fields is infested with a large proportion of weeds which grow with increased vigour when transferred to well-prepared soil. By persistent attention it is possible to eradicate most of the weeds, but the only remedy for coarse grasses is cutting out.

The experiment has often been made of cutting fine turf from downs, but in its new home the grass rarely thrives. The fact is that the evolution of natural turf is an extremely slow process, extending over a long term of years. Soil, climate, altitude, aspect and other influences have shared in the gradual development of the sward, and when such turf is transferred to fresh soil, the grasses disappear, leaving the soil bare, unless, as is frequently the case, it is filled by indigenous weeds.

Should turf be preferred, autumn or early winter is the proper time for laying it. When laid in spring the sections separate under a hot sun or drying wind, and the whole surface becomes disfigured by ugly seams. Fissures have then to be filled with soil and sown with seed. The contrast between the fresh young herbage and the old grass is often visible for months.

The cost of turf, whether it is or is not adapted for a lawn, is almost prohibitive. When cut to the usual size—three feet long by one foot wide—nearly fifteen thousand pieces are required to cover an acre. The expense, including cutting, carting, and laying, may run up to £400. If cut in twelve-inch squares and kept flat, the outlay is still higher. For the same area one and a half cwt. of seed of the highest quality can be obtained for about one-eighteenth of the above-named figure, and should a seeding of two or two and a half cwt. be considered necessary, the outlay will seldom exceed ten per cent. of the cost of turf.

A sward produced from a mixture of suitable seeds is incomparably superior in quality to the best turf usually obtainable. Seeds of the various grasses are saved separately and are harvested with the requisite care to ensure purity. On delivery to our warehouses each consignment is passed through machines specially designed to remove light or worthless seeds, dust, and extraneous substances of all kinds. The percentage of vitality is then determined with exactness by severe and reliable tests. Not until we are satisfied as to the purity and germination of each variety is any prescription allowed to be prepared. A combination of fine grasses can therefore be arranged with absolute precision in the proper proportions for any soil or purpose.

SOIL

From our correspondence it is evident that astonishing unconcern prevails as to the condition of land on which it is proposed to form a lawn. It is often assumed that grass will grow on any soil, however impoverished it may be. Probably this idea is suggested by the free growth of weed grasses in neglected paths and roads. Good lawns cannot be formed from such weed grasses, and there is no hope of establishing a fine dense carpet of grass on land that is incapable of supporting healthy growth.

The ideal soil for a lawn is a rather deep rich loam resting on a subsoil sufficiently porous to ensure effective drainage. Unfortunately land of this character is not often available. In nearly all cases the ordinary cultivated soil of the district must be accepted, and with a little trouble and outlay it is generally possible to create a satisfactory seed-bed.

On a shallow loam, over a bed of gravel or chalk, the grass burns quickly in a dry summer, and when making up the top soil it is always desirable to secure a depth of at least nine inches of good earth. Where the subsoil inclines to clay drain-pipes must first be laid in.

Retentive soils are so difficult to prepare in a late spring that it is wise to get the bed into perfect order during the preceding autumn. Only the surface will need attention in spring, and by this method, in the majority of seasons, seeds can be sown before the spring is far advanced. Soil which is adhesive should be covered with several inches of light loam, or it will poach badly after rain, and take a long time to dry. But the condition of heavy soils can be considerably improved by the addition of sharp sand, coke breeze, charcoal, or similar gritty materials suitable for creating a porous surface, while a dressing of lime will also prove highly beneficial. The most useful lawns are those which remain firm under a shower and dry rapidly when rain ceases.

In the case of peaty and heather soils, close attention must be paid to the question of drainage, especially where a considerable depth of peat exists. On such soils a heavy dressing of lime is also of paramount importance. Peat on the surface should be dug out and replaced with at least six inches of fertile earth. Before heather land can be sown with grass seeds it must be well broken up and thoroughly cleared of roots, after which it will need to be limed and given a heavy dressing of manure.

The soil presenting the greatest difficulty is that which is largely composed of sand, and in a natural state the attempt to establish a fine turf on it is almost hopeless. After an immense quantity of well-decayed manure has been incorporated, the land in two or three seasons appears to be little the better for it. Nothing less than a thick layer of rich and somewhat adhesive loam will ensure a really satisfactory seed-bed. Even then the grass quickly turns brown under a July sun unless it is copiously watered.

Lime. In dealing with new ground one of the first considerations, although often disregarded, is the necessity for lime in the soil. On heavy land lime is especially valuable for its sweetening properties and for its disintegrating effect on the clay. A simple test for lime is to collect a few small samples of earth from different parts of the plot and, after mixing these together, place half a dozen spoonfuls in a glass vessel, just cover the soil with water and add two teaspoonfuls of spirits of salt (hydrochloric acid). When lime is present a gentle bubbling will be apparent, but should there be no sign of effervescence lime is absent and must be added to the soil. Powdered lime will be found the most convenient form and from ten to twenty cwt. per acre, according to the requirements of the land, should be raked into the surface at least a fortnight in advance of any dressing of manure.

DRAINAGE

Should draining be necessary, this operation takes precedence of all other work in preparing land for a lawn. Drainage is so generally assumed to be satisfactory in gardens that the subject is seldom thought of. If rain is freely absorbed by the soil, leaving no stagnant pools in wet seasons, the efficiency of the natural drainage may be inferred. But it should be clearly understood that a fine lawn cannot be established on a bog. Sour land, soddened with moisture, or an impervious clay, must have pipes properly laid before good turf is possible, and, as the trenches are seldom filled so firmly as to prevent the ground from sinking afterwards, drainage should be completed at least six months before seed is sown. The size of the pipes can be determined by the rainfall of the district; the distance between the rows by the nature of the soil. Four-inch pipes for main drains and 2½-inch pipes for subsidiary drains are average sizes; and fifteen feet between the rows, and the pipes three feet below the surface, are common measurements. No single drain should be very long, and the smaller should enter the larger pipes at an angle of not more than 45°, or the flow of water will be arrested. Near shrubberies and hedges the sockets must be cemented to prevent roots from forcing admission and choking the drain; and the outflow ought to be examined periodically to ensure efficient working. Laying the pipes should be entrusted to a practical man who understands the business and will consider the peculiar requirements of the case.

Where it is impossible to obtain an outfall for laid pipes, satisfactory drainage of a small area can sometimes be managed by cutting a deep trench on two or three sides of the lawn and filling with broken brick rubble to within ten or twelve inches of the surface. Cover with rough boards, on which a coating of gravel or soil, as may best suit the purpose, can be laid. This arrangement may be supplemented by digging a deep hole at one corner, choosing the

lowest spot if there be any difference in the level. In this hole sink a barrel of some kind, filled with broken bricks to prevent the staves from caving in. Before it is placed in position bore with a large auger a number of holes in the bottom and also in the staves at varying heights. The top of the barrel to be about one foot below the surface, and a double layer of rough boards will support the gravel which conceals its presence. This simple contrivance will drain a small lawn thoroughly, especially if the brick-filled trenches are run close up to the barrel.

The method of draining a Bowling Green is described on pages 75 and 76.

GRASS SLOPES

Gardens which surround houses on rising ground descend from the terrace by steps and steep slopes to the lawn or pleasure-ground, and some architects arrange for such terraces on land which does not necessitate their construction. When these terraces and slopes are well planned, and harmonise with the dwelling, they are very attractive so long as the grass remains green and is trimly kept. Before making steep slopes, however, it is wise to consider the consequences. Any soil facing south is liable to burn in summer, and the copious use of water will scarcely prevent the turf from turning brown during continued dry weather. In a modified degree this is true concerning slopes which face east or west. There is also a difficulty as to mowing. If the grass cannot be cut by machine, it has to be kept close mainly by the use of shears, and a wearisome business it is. The least neglect results in a ragged appearance, and every bare spot shows conspicuously.

PREPARATORY WORK

Around some of the 'Stately Homes of England' are vast stretches of ornamental turf, which, with their surroundings, constitute landscapes of surpassing beauty. Lawns of this

magnitude need the treatment of a master-hand, and they are beyond the limits we have now especially in view. But the principles which govern the work are applicable alike to great and small. Before seed is sown the land intended for a lawn must be well drained, in good condition, thoroughly firm, with a fine, friable, and true surface.

The charm of a garden is not always enhanced by making a lawn formal in its outline. It may not even be desirable to attempt a level. The trend of the ground and the view from the residence demand consideration. But for outdoor pastimes, such as bowls, croquet, and tennis, which are played on fine turf, a perfect level is imperative. Except for this one point the work of preparation is substantially the same in all cases.

Should no important alteration of the ground be necessary deep cultivation had better be avoided. Digging to the depth of six to nine inches will suffice, and this affords the opportunity of incorporating such manure as may be required. It frequently happens, however, that the desired conformation can only be obtained by the removal or addition of a considerable mass of earth. Possibly the surface may have to be made good by soil brought from a distance. In such a case it is usual to shoot the loads where needed as they arrive, tread the earth firmly down, and make the seed-bed even as the work proceeds. This is the proper method when the whole bulk of earth is obtained from one source and is uniform in quality. But in the event of there being much difference in the character of the soil spread a layer of each kind over the entire plot, putting the retentive portion at the bottom, and reserving the finer and more friable loam for the top. To make up one part of the ground entirely with loamy clay, and another part with light loam, will result in a patchy appearance, because each soil fosters those grasses which possess affinities for it.

When a level lawn has to be formed on sloping ground the first procedure is to wheel off the whole of the surface

soil to some near convenient spot. Then make the subsoil perfectly level, and after it has been duly tested restore the surface soil evenly over the entire area. The mistake is often made of taking the soil from the higher side and wheeling it to the lower end, with the result that the raw subsoil of one part is exposed, on which it is impossible to create a plant of fine grasses.

In order to ensure a level, pegs must be driven into the soil at the extreme points of the plot, and intermediate pegs at regular distances between. The pegs should be accurately adjusted by means of a long piece of wood having a straight-edge, on which a spirit level can be placed. By shifting the wooden straight-edge from peg to peg the level of the whole area may be efficiently tested.

Sometimes the soil is found to be infested with Couch or Twitch (*Agropyrum repens*, formerly known as *Triticum repens*), and the presence of this pest must on no account be lightly regarded. It may be necessary to pass the whole of the surface soil through a fine-meshed riddle to clear the land effectually from every scrap of the roots. Small lengths that escape will form new plants and spoil the sward. Dormant roots of Dandelion must also be removed, or they will prove troublesome later on.

WEED SEEDS IN SOIL

A serious danger to which imported soil is liable is the presence of seeds of indigenous weeds. The only certain way of ridding soil of these pests is to burn it, but unfortunately this treatment is not equally suitable for all classes of land. When clay forms the principal constituent of the soil, burning is desirable and is often worth undertaking for the beneficial effect it has on the growth of grass. The disintegration of the clay, which is one of the good effects of burning, may to some extent be obtained by digging the ground in autumn and leaving it rough to be

broken down by frosts. Light soils, however, are in no way improved by burning. On the contrary, the fertility of the land is decreased. The operation of burning soil is well understood by agriculturists, but we are not unmindful that practices which are permissible on a farm would not be tolerated in the majority of gardens. The farm is in the open country, where smouldering fires are not regarded as a nuisance. Near a town they may call forth a storm of remonstrance. Where burning is impracticable, the only alternative as regards weed seeds is to allow plenty of time for germination, and to destroy successive crops by light hoeings in dry weather. Waiting for the appearance of weeds may be extremely vexatious when the land has been prepared and the season is passing away. Still, it will prove a real saving both of time and labour to ensure a clean seed-bed. After grasses are sown the soil ought not to be disturbed, and atmospheric influences may follow which retard the germination of the grasses but do not hinder the growth of weeds. The latter rob the soil of its moisture, choke the rising grasses, and too often doom the sowing to failure. Those who are practically acquainted with gardening know that land which has been regularly cultivated for years, and is supposed to be fairly clean, always produces a plentiful crop of weeds, although no seed whatever be sown; yet many a faultless lot of grass seed has been condemned when the weed seeds were in the land or were introduced in the manure used for dressing it.[1] Delay in sowing offers the further advantage that the soil becomes thoroughly consolidated—a condition which is highly favourable to grasses, and very difficult of attainment under hurried preparation.[2]

[1] Our attention has been called to an extremely interesting case, showing the length of time that seeds lie dormant in the soil and how readily they germinate when brought to the surface. A large rabbit warren on the Oxfordshire hills was dug and levelled. No other soil was used, nor were seeds of any kind sown. Yet in the succeeding season a dense plant of yellow charlock appeared over the whole surface, and in the following year the charlock was succeeded by a mass of white campion (*Lychnis vespertina*). The seeds of both plants must have been buried in the earth for an unknown number of years, and the disturbance of the soil enabled them to germinate. Had grass seed been sown, it might have been erroneously assumed that the seeds of charlock and campion were included in the mixture of grasses.

[2] For the destruction of weeds in Lawns see page 32.

ENRICHING THE SOIL

In preparing the seed-bed for a lawn, the state of the soil is too often disregarded. Luxuriant Peas, Beans, Broccoli, and Lettuce are not expected from poor land; but any soil, however exhausted, is often considered good enough for a lawn, although grass is quite as easily starved as any other crop. After the sward is established the enrichment of the soil has to be effected under disadvantages to which other crops are not subject. Vegetables in a well-ordered garden are in successive seasons changed from plot to plot to tax the soil for different constituents. The ground is frequently broken up, manured, and exposed to atmospheric influences which increase its fertility. Grass is a fixed crop, chiefly deriving its nourishment from a few inches near the surface, and the only way of refreshing it is by raking or harrowing and top-dressing. Hence there are obvious reasons for putting the land into good heart before sowing grass seeds. Well-rotted stable manure is always beneficial, but fresh manure should be avoided because of its tendency to make the soil hollow. Thirty cartloads of decayed manure per acre will probably suffice. To ensure the young grasses obtaining full advantage of the dressing, the material should not be deeply buried but only forked into the top soil. It is an unfortunate fact, however, that stable manure often contains a large number of fertile seeds of weeds and coarse grasses.

Where artificials are more convenient, Sutton's Complete Grass Fertiliser should be used. This excellent combination of artificials is specially adapted for enriching soils deficient in the constituents which promote the growth of the finer grasses, and the quantity required may vary from five to seven cwt. per acre, according to the condition and nature of the land. Evenly spread over the ground and lightly work into the surface soil while the preparation of the seed-bed is in progress. An advantage of the Complete Grass Fertiliser over other artificials is that it may be safely used a few days in advance of sowing grass seeds. The following will also make a good dressing :—two cwt. of super-

phosphate of lime, one cwt. of Peruvian guano, one cwt. of sulphate of ammonia, and from two to four cwt. of bone meal.[1] These quantities, mixed together, will usually suffice for an acre, and should be applied about a fortnight before sowing grass seeds, or some of the germs may be destroyed.

The necessity for lime in the soil is dealt with on page 4.

SURFACE PREPARATION

A fine friable surface is requisite to ensure favourable conditions for the seed, and in levelling the ground there must be a diligent use of the rake and roller. It is not sufficient to go over the ground once with each implement. Repeated raking assists in clearing the land of stones, unless they are very numerous, in which case two or three inches of sifted rich earth should be evenly spread over the surface. After every raking follow with the roller, each time in a different direction. These operations reveal inequalities, pulverise the soil, and impart to it the firmness which favours germination. Grasses, particularly the finer varieties, are too fragile to force their way through clods, and many seeds will be lost altogether if buried to a greater depth than a quarter of an inch.

When the preparation of the seed-bed for a spring sowing is finished late in autumn or during winter, the plot is allowed to lie fallow. This affords an opportunity of again testing the level and of filling hollows or removing prominences that may be discovered. By March it will be found that the surface of the soil has acquired a firm crust as the result of rain or snow. In all such cases, where an interval has elapsed between preparation and sowing, the earth must be broken with a rake into a very nicely crumbled state before seed can be sown with

[1] As the free use of bone meal on certain soils invariably promotes a strong growth of clover, this artificial should be avoided where the grass is intended for games or where clover is not wanted. In such cases the other artificials must be proportionally increased.

any prospect of success. This finishing touch needs to be carried out with patience by a skilful hand, and it must be thoroughly well done. Good work will leave the surface almost as true as a billiard table.

Where earthworms are numerous in newly prepared ground and it is desired to eradicate them, the operation should precede the application of artificial manures and the sowing of seeds. The destruction of worms in lawns is fully dealt with on page 26, and here it will suffice to state that the most efficient means is by the use of Sutton's Worm Destroyer at the rate of half-pound to one pound per square yard. Evenly distribute the powder over the ground and freely water in to ensure the material reaching the worms, which then come rapidly to the surface and should be removed.

SELECTION OF SEEDS

The character of a lawn produced from seed is determined for its entire existence chiefly by the varieties and proportions of grasses included in the mixture. Many grasses which are valuable in a meadow or pasture for the excellent fodder they yield are unsuitable for the formation of a dense carpet of grass. It is therefore of the highest importance to include fine-growing varieties only, in the exact proportions required for the soil to be sown and the purpose for which the lawn is intended.

Whether clovers should also be used depends on circumstances. On some soils and in certain districts clovers are indigenous and will in time appear, although no seed be sown. Where this is known to be the case it is wise to omit clovers. On light land, liable to burn in summer, clovers remain green after grasses have become brown. But unless the clovers are evenly distributed among the grasses (and this is seldom the case) the sward presents a patchy appearance which is far from attractive. Even on shallow soils, where grasses readily burn in average seasons, the presence of clovers

can only be regarded as an advantage when the two classes of plants are carefully proportioned, for although clovers show conspicuously in summer, they partially disappear in winter.

As a rule lawns intended for bowls, croquet, or tennis should be composed entirely of grasses. Players complain that in dry weather clovers make the turf slippery, while after a shower they hold moisture longer than grasses and quickly discolour tennis balls. A further objection is that they do not stand hard wear so well as grasses. For these reasons we consider it desirable in almost all cases to omit clovers from mixtures for the formation of turf on which any kind of game is to be played.

The following grasses and clovers are specially suited for lawns, and the characteristics of the several varieties indicate the soil and purpose for which each kind is naturally adapted. It is seldom necessary to include the whole of them in any one prescription.

Crested Dogstail (*Cynosurus cristatus*).—The foliage is dwarf, compact in growth, and remains green for an unusual time in the absence of rain. The roots are capable of penetrating the hardest soil, and the plant is well adapted for sowing on dry loams, especially such as rest on a chalky subsoil, for which it manifests a marked partiality.

Hard Fescue (*Festuca duriuscula*) grows freely on sheep downs, and when mingled in due proportion with other varieties it contributes largely to the formation of a fine close turf. The plant commences growing early in spring, and seed should be sown on all soils that are not very wet. The common name applies solely to the flower heads, which when ripe are decidedly hard. Of all the grasses known in this country, *F. duriuscula* is probably the most hardy. It endures cold and drought equally well.

Sheep's Fescue (*Festuca ovina*) is intermediate between *F. ovina tenuifolia* and *F. duriuscula*. It is somewhat taller but does not grow so tufted as the former, and is of a brighter green and more succulent than *F. duriuscula*. True seed is difficult to obtain.

Fine-leaved Sheep's Fescue (*Festuca ovina tenuifolia*).—The foliage of Fine-leaved Sheep's Fescue maintains its dark green colour for some time in hot dry weather, and is so slender as to render the term 'blades of grass' almost a misnomer. Although this grass will combine freely with other varieties, a homogeneous turf cannot usually be obtained from Fine-leaved Sheep's Fescue alone. As the roots descend to a great depth in search of moisture, the plant thrives on sandy or rocky soils. In the early stage of growth it is easily overpowered by weeds, and for this reason autumn is preferable to spring sowing, because weeds are then less prevalent. But for the finest sward *F. ovina tenuifolia* cannot be dispensed with, at whatever time of year a sowing may be made. After the plants are established they easily hold their position. Full development is not attained until the second or third year.

Red Fescue (*Festuca rubra*) possesses many desirable qualities which are of especial value in a lawn. The foliage is very fine, close-growing, stands hard wear, and the plant is not exacting as to habitat. It thrives on the driest and poorest soils as well as on the best loams. The true Red Fescue is quite distinct from other fine-leaved varieties and has the advantage of a more or less creeping habit.

Sutton's Small-seeded Perennial Rye Grass (*Lolium perenne Suttoni*).—This grass constitutes a considerable proportion of the herbage of many beautiful lawns. It is of especial value on the heavier soils, and it also deserves attention when, as frequently happens, a sward has to be formed in the shortest time possible. Seed germinates rapidly, and the plant occupies the ground while slower-growing varieties are developing. The herbage of Perennial Rye Grass is excellent in colour and retains its verdure throughout the year, unless burned by excessive drought, from which it speedily recovers. But isolated plants are a nuisance, and they are generally most troublesome in the second season, when the long spreading stems mar the beauty of a lawn. The seeding must therefore be sufficient to fill the ground with roots and produce a dense plant.

Another point of great importance is that Perennial Rye Grass should be closely mown from its first appearance and continuously during the entire growing season. Should individual plants throw out seed-stems laterally they ought not to be allowed to become unsightly. A lad working between lines three feet apart can easily remove them by knife or scissors. There will be no renewal of the trouble until the following season, and as the sward thickens by the development of finer but slower-growing grasses the tendency to spread seed-stems will decrease. But where necessary a rake may be trailed in front of the mower to assist in clearing them.

Those who object to the presence of Perennial Rye Grass should mention the fact when ordering seeds.

Smooth-stalked Meadow Grass (*Poa pratensis*).—In the United States *Poa pratensis* is often sown alone for lawns. During the first year the effect is disappointing, but subsequently it makes a satisfactory turf, putting forth fresh green foliage with astonishing rapidity after the burning drought experienced in that country. In the United Kingdom better results can be obtained from a combination of seeds, and we do not advise the exclusive employment of *Poa pratensis*. Although somewhat shallow-rooted, this grass withstands drought remarkably well. Light land, rich in humus, favours free growth, but it will also thrive, yet not so luxuriantly, on heavy soil. The plant does not develop its full proportions in the first season.

Rough-stalked Meadow Grass (*Poa trivialis*) is somewhat similar in appearance to *Poa pratensis*, but instead of being adapted to dry light soils, it flourishes in strong moist situations, and unless the land contains abundance of potash and phosphoric acid the plant speedily disappears. *Poa trivialis* should be liberally employed for shaded lawns, as it endures the presence of trees almost with impunity.

Wood Meadow Grass (*Poa nemoralis*).—From the perpetual greenness and dwarf close-growing habit of this grass it is admirably suited for lawns and pleasure grounds.

The growth commences very early in spring, and although the plant is quite at home under the shade of trees, it is one of the best grasses for enduring drought.

Annual Meadow Grass. See page 40.

White Clover (*Trifolium repens var. sativum*) is indigenous all over the country, and may be seen growing freely by roadsides; indeed, it grows better in poor than in rich land. At some depth in the soil seed will lie dormant for a long period and germinate freely when brought to the surface. This variety is one of the clovers most frequently sown on a lawn. Constant mowing and rolling result in a dense mass of herbage.

Yellow Suckling Clover (*Trifolium minus*).—The very small foliage of this clover is of especial value for lawns where clover is wanted. It is a quick-growing plant, showing abundantly in summer just when the grasses are thin and the dense foliage of clover is most welcome. The plant is really an annual, but it is perpetuated by seeding freely even when closely mown.

Yarrow, or Milfoil (*Achillea millefolium*) is neither a grass nor a clover. The plant is indigenous in many districts, and may be seen in some of the finest and most beautiful lawns in the Kingdom. At Kew Gardens, seed of Yarrow is sown over the grass, and the closely mown soft elastic turf not only bears the constant traffic of visitors without injury, but the herbage remains fresh and green after the grass has lost its attractive appearance. On hot, gravelly, limestone or chalky soils, Yarrow might often with advantage be encouraged. Occasionally it appears so persistently without sowing that only by constant attention can it be kept down, and it seems to be mere waste of energy to wage continual warfare against this plant on soils where it thrives under heat that withers up grass and even the more enduring clover. But in such cases the sward needs to be very closely mown, or the herbage becomes coarse and unsightly.

So many persons entertain a strong objection to the presence of Yarrow in a lawn that we never include seed of it in a mixture of grasses unless by special request.

QUANTITY OF SEED

We need scarcely allude to the necessity of sowing new and pure seed, strong in germinating power. Seeds of the grasses and clovers suitable for producing a lawn are nearly all high in price, and some of them are very expensive. But as fine grasses do not tiller out to the same extent as the larger pasture varieties, a liberal seeding is imperative. We recommend a sowing of one and a half to two and a half cwt. per acre, and should the lawn be wanted in the shortest possible time the larger quantity should be used. The additional outlay will be well repaid by the rapid clothing of the ground; and the more closely the plants are crowded the finer will be the herbage.

Small plots of land cannot be sown economically without incurring the risk of thin or bare patches. It is therefore desirable that abundance of seed should be allowed. The quantity required to produce a dense plant on a full-sized double tennis court affords an excellent example of what we mean. The dimensions are 78 feet by 36 feet,[1] and for fast play a margin of about 21 feet must be provided beyond each base line, with 12 feet outside each side line, making a total of 120 feet in length by 60 feet in width. In many gardens a tennis lawn of this extent cannot be secured and players have to be content with smaller margins. For the area named, half-cwt. of seed evenly sown will suffice, if time can be given for the full development of the plant, and feathered foes are kept off the ground. But a tennis lawn is generally wanted before the ground is prepared, and as the only means of ensuring the speedy formation of a fine dense sward is by very thick seeding, the sowing of three quarters of a cwt. of grass seeds on a plot of land of the dimensions referred to is not only reasonable, but under urgent circumstances even a larger quantity can scarcely be open to the charge of extravagance. When sowing small lawns it is a safe rule to use not less than one ounce of seed per square yard of land.

[1] See plan on page 58.

SOWING

Grass seeds may be sown at any time between the middle of March and the end of September. But from about the 15th of May to the second week in August, or a little later, hot, dry weather often proves destructive to the young plants. They cannot acquire sufficient stamina to endure prolonged drought or fierce heat unless constant watering is possible. From the middle of March to the first week of May is the best period for spring sowing—the earlier the better in a favourable season ; and from about the 20th of August to the middle of September for summer or autumn sowing. Occasionally a good plant is obtained from seed got in during October, but these late sowings are not to be recommended as a rule, and although circumstances arise which justify the risk, they must be regarded as hazardous. Success entirely depends on atmospheric conditions, and especially on a continuance of warm nights.

Clovers sown in autumn are liable to destruction by a severe winter, even if slugs spare the plants. Should there be failure from any cause, seed must be sown again in the following spring.

Small or medium-sized plots are usually sown by hand, but however skilful the sower may be the seed can always be more evenly distributed by two operations than one. The seed should be divided into two equal portions ; the first to be sown moving north and south, the remainder east and west, or *vice versa*. This method is open to extension, where desirable, by lining off the ground into several equal spaces and dividing the seed into double the number of equal quantities.

As seeds of the finer grasses are both small and light they are easily blown to a distance by a high wind ; a calm day ought therefore to be chosen, and the sower must keep his hand low.

For larger areas the seed barrow can be used with advantage, but even with this implement two sowings are preferable to a single operation. Or a regular distribution of the seed can be ensured by the use of the 'Aero' Broadcast Hand Seed Sower which is supplied at a moderate price. The man engaged for the work should keep an even pace, and it is safer to sow twice, using two-thirds of the seed moving up and down the plot, and the remainder across the ground.

After sowing, the entire surface must be lightly raked, with the object of covering as many seeds as possible. Those which are deeply buried will not germinate, and those which are exposed may be scorched by the sun, or consumed by birds. Put the roller over twice, first north and south, then east and west. On spots missed by the roller the grasses usually fail.

When all this has been done a proportion of the seeds will remain exposed, many of which may never germinate, and it is worth some trouble to protect these seeds by a thin covering of finely sifted soil. In dealing with small plots there should be no difficulty, and in most gardens where greenhouse plants are grown to any extent there is an accumulated heap of stuff which has been knocked out of pots. This is excellent material for the purpose; it is generally of the right texture, fairly free from weed seeds, and only needs to be passed through a fine sieve before it is evenly spread over the sown area. On very heavy land a thin covering of clean sharp sand is preferable to soil. Finish by once more rolling down.

Protection can be afforded to the young grasses when about an inch high by a light dressing of rape meal or malt culms. These materials not only serve to shield the tender blades from the scorching rays of the sun, but also act as a gentle stimulant to the plant.

The following question is frequently asked:—How soon after seeding will the lawn be fit for use? No definite answer can be given. It depends on the period of the year, the quantity of seed sown, the weather which follows, and the attention bestowed on the rising grass. The maturity

of the plant is also influenced by the nature of the soil, aspect, and district. An August or early September sowing should produce, under favourable circumstances, and with generous treatment, a good turf during the following summer. Spring sowings are dependent on variations of temperature and other vicissitudes of the season; but when the atmosphere is genial and the plot receives due attention, the plant rapidly fills the soil, and the sward is often sufficiently developed for careful use towards the end of July or beginning of August. In all cases where a lawn is wanted quickly an extra thick seeding is necessary.

On very dry soils a spring sowing is sometimes ruined when followed by a period of hot dry weather. There may be sufficient moisture to start the germs, but under a few days of fierce sunshine the land becomes too dry to sustain the young grass until rain falls, and the plant withers away. In cases of failure from this cause the bed should be kept free from weeds until the approach of autumn. Towards the end of August or beginning of September rain and dew generally ensure germination of the seed. At that period of the year the grass rises quickly from the warm soil, and if cut early and frequently the plant becomes fairly established before winter sets in. Dry sandy loams, on which it is difficult to obtain a plant from a spring sowing, are often sown with success at the commencement of September.

BIRD SCARES

Sparrows and several of the finches are particularly partial to grass seeds, and they do mischief in other ways. The birds break up the surface, eat until surfeited, and then take a dust-bath. There are many methods of scaring them, and some plan must be adopted to preserve the seed from these marauders.

Small plots can be protected by nets, but on a large scale this mode of defence is, of course, out of the question. One

method, both simple and cheap, is to connect lengths of twine to tall stakes, and at intervals hang feathers, or strips of glittering tin slightly twisted in order that they may be freely turned by the wind. When the sown area is extensive it should be watched by boys until the plant appears. Two will be required to relieve each other during the long day from sunrise to sunset. If it will not prove a nuisance, they may be entrusted with a gun and a few blank cartridges. Or an irregular network of black thread may be employed. The strands need not be very close together, but they must be black. Occasionally a bird touches one of them and is thoroughly startled. On small plots, after the bed has been rolled, a thin dusting of soot renders the seed distasteful until rain falls, when the dusting may have to be renewed. As soot is nitrogenous in character, it will benefit the grass. But soot which has been stored and mellowed for a year or more is preferable to that which is new. On heavy soils the seed may be covered with a thin layer of clean fine sand. This aids germination and is some protection against birds.

WORM CASTS

In a short time after sowing, the ground is often thickly covered with casts thrown up by worms. We have no desire to question the general service rendered by these lowly creatures, but their movements in ground newly sown for a lawn are mischievous, and the damage they cause will be in proportion to the looseness of the soil. A well-made, firm seed-bed is less liable to injury than one that has not been properly consolidated by the roller. On old lawns the cast is thrown up from a well-defined orifice seldom exceeding a quarter of an inch in diameter. Worms loosen the soil of a newly made seed-bed for a considerable distance around each burrow, and on this broken earth not a seed will germinate. It would be comparatively unimportant if the casts were few and far between, but frequently scores of them may be seen on a pole of ground.

When and how the casts should be dealt with is sometimes a source of perplexity. A few days after sowing, a light roller will gather them up, if moist, and the implement must be scraped at the end of every run. When the casts are dry the roller will crush them and remain clean. Provided that germination of the seed has not taken place, this light rolling may be repeated once or twice, if necessary, always taking care not to break the surface either with the foot or the roller.

Those who wish to rid the soil of worms, either before seed is sown or after grass is established, may do so by using the preparation we supply expressly for the purpose, and which has been extensively employed with the greatest success. Not only does this preparation do its work efficiently, but it is a thoroughly good manure for grass.

On bowling greens, tennis and croquet lawns worm casts are often extremely troublesome. When a plot is being prepared for either purpose the entire area should be cleared of worms before seed is sown. The quantity of worm destroyer required is from half a pound to one pound per square yard. After the powder has been evenly spread, water must at once be copiously used, for the destroyer acts only when it reaches the worms. Rain may be falling at the time, but even then watering is essential. The worms will come to the surface and expire. They should be swept up, placed in a deep pit, and covered with salt or lime. Many, however, are killed in their burrows and never appear above ground.

The same treatment can be successfully adopted on established bowling greens or lawns.

It is useless to spread the destroyer when worms have been driven below the surface either by frost or a prolonged period of dry weather. Nor is it advisable to apply the powder while the grass is in a young and tender stage of growth.

WATERING LAWNS

Should severe drought follow the sowing there is a possibility that the seeds may be 'malted.' In spring the soil is generally moist enough to start seed-germs, but a period of dry weather arrests growth, and the fragile seedlings wither away. As a rule the watering of newly sown land is to be avoided, but in the event of continued drought after the plant is visible, water must be used to save the grass. A small plot can easily be watered by hose and sprinkler, or even by the water-can fitted with a fine rose. A large area presents difficulties, especially in the absence of hose, or if water has to be carried a considerable distance. In any case there must be no rough trampling on the soil. Flat boards laid at intervals, and ordinary care, will prevent injury from the traffic. The water must be delivered in a fine spray, and for a sufficient time to prevent the necessity of an early repetition.

Established turf, particularly when in constant use for bowls, croquet or tennis, cannot be maintained in verdant condition during a long spell of dry weather unless a plentiful supply of water is available. Wherever possible water pipes should be laid on to the ground, and this is essential in the case of light sandy soil, or where lawns and greens are used for club play. A sprinkler capable of distributing a fine spray is to be preferred to the nozzle affixed to hose. The greater force of water supplied by the latter often washes soil from around the grasses, thereby exposing the roots. Late afternoon or evening is the safest period to start the sprinkler, and sufficient water should be given at one time to thoroughly soak the ground to a depth of a few inches. But the continued use of water during summer deprives the soil of much soluble plant food, to replace which a dressing of Sutton's Complete Grass Fertiliser in early autumn is desirable.

MOWING

Among the inquiries which reach us concerning the management of lawns, one of the most frequent questions relates to the height young grass should be allowed to attain before it is cut. Instances come to our knowledge where the plant is actually left untouched for an entire season. Lawn seeds are sown to produce a short, dense sward, not a crop of hay. On this point there must be no misunderstanding: immediately the plant will take the scythe it should be mown. Early cutting encourages the grasses to tiller out, and their roots begin to fill the soil; the mower and roller are brought quickly into use and contribute to the development of a smooth and even plant.

The first cutting should be made with a sharp scythe wielded by a practised hand. So far as newly sown lawns are concerned, it is unfortunate that the skilful use of the scythe is a dying art. But it is none the less true that this is the ideal implement for young grass. Indeed, the risk of injury from the mower, especially from a heavy machine, is so great that many experienced men condemn its employment until the plant is fairly established. Still, it is necessary in this, as in many other affairs of life, to face facts. We are sometimes told that there is not a man available who can cut fine grass with a scythe. In such cases the only alternative is the mower. Before using it, however, a trial on old grass will prove whether the implement is capable of making a clean cut without tearing up the plant. For this early work the machine should be moderate in size, although later on a heavier mower can be employed where desirable.

In the judicious use of the machine lies one secret of maintaining a close sward. During severe winter weather cutting may not be necessary for several weeks. But

early in the year, probably in February, the ragged plant should be mown, and as the season advances the need for more frequent cutting will be evident, until, in warm moist weather, mowing twice a week, and possibly, for a brief period, every alternate day, may not be too often. No definite rule can be stated on this point; but the grass should never be allowed to wear a neglected appearance, nor should the work be postponed to a more convenient season. Setting the mower requires the exercise of judgment. It must never be so low as to graze the surface, and in summer, during scorching sunshine, it will be advisable to raise the cutter a trifle higher than for a strong spring growth. As autumn advances, mowing may be less frequent, and can be discontinued altogether when the grass ceases to grow. The date will depend on the district and the character of the season.

A more even sward will be obtained if mowing is not always carried out in the same direction. After cutting in the line of, say, north and south, the machine should be used east and west on the next occasion, and so on alternately.

A much debated question concerns the use of the grass box. Experience has proved that when the machine is regularly used without the box the plant certainly derives benefit from the cut grass left on the lawn, and the cuttings afford some protection against hot sun. On the other hand there are three objections. The practice greatly increases labour, spoils the lawn for play, and disseminates weeds. At the height of the growing season, when the grass has not been cut for a few days, the swath of a dense lawn accumulates in front of the mower until the work becomes extremely laborious, assuming that the mower has a forward delivery. The presence of the cut grass on a lawn renders tennis very slow and erratic, and on a bowling green it would be simply intolerable.

In our opinion the box should be attached to the machine for cutting all lawns that are used for play, and, as a rule, for pleasure lawns also.

ROLLING

Next in importance to mowing is the use of the roller. It is impossible to establish a lawn, or to maintain turf in the finest condition, in the absence of a roller of suitable weight.

After the first cutting of young grass the whole plot must be slowly compressed with a rather light roller, and the work needs care to avoid breaking the surface by a clumsy foot. When the grass has been cut two or three times an implement of greater weight is an advantage, and it is not sound practice to use it always in the same direction.

Established lawns should be regularly rolled in suitable weather and the effect is enhanced by going twice over the ground. The need for constant rolling, however, is not so great on heavy soils as on those of a light character. When the soil becomes hard through drought, the operation can do no good; but after rain, rolling is always beneficial, especially in spring and autumn. During frost it will be injurious, but as the temperature rises, and the grass becomes sufficiently dry, a fairly heavy roller will consolidate turf which has been lifted irregularly by intense cold.

The selection of a roller deserves a moment's consideration. The weight and pattern should be determined not merely by the character of the lawn, but also with some regard to the person who has to move it. For general use on heavy ground a roller weighing from one to two cwt., according to the consistency of the soil, will suffice; for light and sandy land the implement may weigh from three to four cwt. Those having hollow double cylinders, with rounded outer edges, can be far more easily moved than ballast rollers of similar weight. The latter are so much smaller in diameter that the work becomes distressing. On club tennis lawns and cricket grounds much heavier rollers are used, but in such cases the requisite assistance is usually at command.

Another point is important. Not only does a ballast roller augment labour, but in turning it grinds off the grass. The result is injurious to an established sward and proves disastrous in the case of a young plant.

DESTRUCTION OF WEEDS

After most careful preparation of the land numerous annual and perennial weeds are certain to appear. No matter how long the soil may have been cultivated, the weeds which are indigenous in every district will, after any disturbance, soon cover the ground. No soil is ever free from them unless it has been burned, and then the immunity is all too brief. Some weed seeds are introduced by stable or farmyard manure, others by birds, and several kinds are wafted long distances by the winds. For practical purposes, and so far as lawns are concerned, it is unsafe to recognise the distinction between annual, biennial, and perennial varieties. The annual weeds will of course die out if they are not allowed to seed: but unfortunately some of them lie so close to the ground that the mower does not prevent seeding.

On a newly sown lawn every weed does mischief by smothering a number of grasses, and the whole plot should be frequently examined for the purpose of removing weeds while they are quite small. With a little care they can be drawn with the right hand between the fingers of the left hand placed on the ground, without uprooting the surrounding plants of young grass.

Coarse grasses are indigenous on many soils, and perhaps the most common of these is Yorkshire Fog (*Holcus lanatus*). The presence of this worthless variety can at once be detected by its broad, pale green hairy leaves. While young the plants can be easily removed, but when a firm hold has been secured the only remedy is cutting out. If left, every patch will increase in size from year to year by seed ripened on the recumbent stems, which are untouched by the mower.[1]

[1] On high ground in Berkshire a field of several acres was for a long term of years continuously cultivated as allotment gardens. The land was bought by a speculative builder, and left untouched. No seed whatever was sown. Two years after cultivation had ceased, the entire area was covered with ***Holcus lanatus.***

Another instance shows how easily a good lawn may be injured by the introduction of strange soil. A small but beautiful lawn was established from seed on ground from part of which gravel had been excavated. Two years later a depression appeared on this portion of the lawn, and the surface was made level with sandy loam obtained from a neighbouring field. In a short time ***Holcus lanatus*** appeared on this part of the lawn, and attempts to destroy it by top dressings failed. Cutting out and replacing with fine turf was the final remedy.

It is surprising in how brief a time the turf of an established lawn will, if neglected, be marred by plants of daisy, dandelion, plantain, thistle, and other pests. To keep the grass free there must be a systematic examination for the express purpose of destroying weeds. Many methods are employed. A common procedure is to cut out each plant either by spud or knife about an inch below the surface. A pinch of lawn sand, salt, or sulphate of ammonia, dropped on the cut root will usually prevent further growth. The lad who does this work should understand what he is about, for a plantain merely cut off below the collar will produce half a dozen crowns, in the same manner as Sea Kale, and prove a greater nuisance than the original plant ; and by the careless use of salt, patches of grass are easily killed. Daisies can be lifted separately, each plant with its root entire, and although new growth may here and there appear for a second or even a third time, the daisies will be weaker, and a little perseverance will speedily rid a large grass plot of every one of them.

Another mode of killing weeds is to dip a wooden skewer into sulphuric acid, strong carbolic acid, or one of the liquid weed destroyers, and then plunge the skewer into the heart of the plant. The result is deadly and instantaneous. In using these destructive fluids, however, great caution must be exercised to avoid personal injury or the burning of clothing. But when every care is taken to prevent an accident, the fact remains that these corrosive fluids may prove to be a source of grave danger, even when the bottle containing the liquid is kept in a place of supposed security. For this reason poisons are better avoided, especially as the object can be attained by other means which are free from danger.

Of the methods already described one is objectionable because it makes holes in the lawn, and the use of poison involves the more serious risk of personal injury. Long continued experiments and numerous reports from correspondents have convinced us of the value of the lawn sand we specially prepare in our own warehouses for destroying weeds. The advantages are that there is no disturbance of the surface, the sand is perfectly safe,

economical in labour, and invariably efficient against broad-leaved plants, including daisy, several varieties of plantain, the common buttercup, besides many smaller weeds. Individual specimens may be destroyed by covering the foliage with the lawn sand, and, of course, the quantity required depends on the number of weeds. But where the weeds are thickly interspersed amongst the grass it may be desirable to cover the entire area with lawn sand at the rate of about four ounces per square yard, or ten cwt. per acre. This preparation is most effective when the ground is fairly dry, with a prospect of fine weather for twenty-four to forty-eight hours afterwards. Weeds having strong tap-roots should also be pierced vertically with some sharp implement. The sand does no permanent harm to the grass. On the contrary, it is an excellent manure; but for a few days after application the herbage presents a scorched appearance. The surface of lawns, especially those on heavy soils, is generally improved by this treatment.

Powdered sulphate of ammonia is also used for destroying weeds, and a pinch of the artificial placed on the heart of each plant, the quantity being proportioned to the size of the specimen, is usually efficacious. Very strong weeds should be stabbed vertically as already advised.

Nitrate of soda is another well-known destroyer of weeds, but, unfortunately, it promotes a strong growth of the coarser grasses, and is therefore more suitable for meadows and pastures than for lawns.

When extirpating the weeds in a lawn the work should be done systematically. Instead of aimlessly wandering hither and thither, it is more economical to mark off with a garden line a strip three feet wide, and destroy the weeds within the enclosure. Follow with successive strips until the whole lawn has been dealt with, and it is surprising how quickly a large area may be cleared of weeds.

After large patches of weeds are destroyed the ground becomes bare, and the spots must be scored or pricked with a fork and sown with seeds. This should be done about

a fortnight or three weeks after lawn sand or artificials have been used.

The weeds most frequently sent us for identification and advice are the following :—

Common Buttercup, or Crowfoot (*Ranunculus acris*).—The well-known perennial variety common in almost every pasture. It varies in size, and is more or less covered with soft hairs, which are mostly spreading, but deflexed on the lower part of the stem. The leaves are nearly all stalked, and deeply divided into three, five or seven palmate segments. Flowers rather large, bright yellow, on long stalks. Sepals yellowish green, concave, but not reflexed on the peduncle. Stabbing the heart of the plant with a sharp instrument and applying lawn sand is efficacious, though sturdy specimens sometimes require a second treatment.

Bulbous Buttercup (*Ranunculus bulbosus*).—A hairy erect perennial having a bulbous base to the stem, but without the running shoots found in *R. repens*. Flowers vary from a half to one inch in diameter, the sepals being reflexed so as to touch the stem. Most frequently met with on light and calcareous soils. This species can be destroyed by lawn sand, but it is important to stab the corm, which generally lies on one side of the root-stock. The only alternative is to remove the plants by hand and they are more easily lifted after the ground has been softened by rain.

Creeping Buttercup (*Ranunculus repens*) is extremely difficult to eliminate, as runners shoot out from among the radical leaves, and new plants are formed at every node. The flower stems are seldom a foot high ; leaves divided into three stalked segments, each one lobed and toothed, the central one projecting considerably beyond the others, giving the whole leaf an ovate form as distinct from the rounded leaf of the Common Buttercup. It is necessary to cut out this pest and replace with fresh turf, or fill the cavity with good soil on which sow seed at the proper time.

Lesser Celandine, or Figwort (*Ranunculus Ficaria*).—This weed is abundant in this country and is common throughout Europe and Western Asia. In addition to the fibrous roots a number of oblong or cylindrical small tubers are produced, each one capable of becoming a perfect plant. The only remedy is cutting out, and in doing this the whole plant, including every one of the tubers, must be removed.

Mouse-ear Chickweed (*Cerastium vulgatum*) is exceedingly troublesome when it appears in a lawn. This annual seeds freely from the spreading branches, which form a dense mat and quickly destroy the grass. The plants should be dealt with immediately they are noticed. It is almost impossible to clear them out by hand; some fibres remain and renew the trouble. Cut the mass closely with shears and cover the spot with lawn sand. Common Chickweed is amenable to the same treatment. Later on young plants will appear from shed seed and it will be necessary to examine the grass occasionally to remove these seedlings.

Couch, Quitch, or Twitch (*Agropyrum repens*, formerly known as *Triticum repens*).—A perennial with strongly creeping root-stock, and very difficult to deal with. If care be taken to remove every particle of root when preparing ground for seed, this grass will rarely afterwards appear. See paragraph concerning this pest on page 9.

Daisy (*Bellis perennis*).—The plants are so easily destroyed by lawn sand that there really is no excuse for the presence of daisies in ornamental grass.

Dandelion (*Taraxacum*).—However carefully one's own garden may be kept, seeds of this weed are blown on to lawns from hedgerows and neglected ground. The plant has a thick tap-root, and if the head be cut in May, just below the collar, the root will often bleed to death. At other periods of the year lawn sand worked into the tap-root frequently proves successful, but spudding out is undoubtedly the best method of eradication.

Common Fumitory (*Fumaria officinalis*).—This annual sometimes makes its appearance in lawns, but usually dies out under persistent mowing.

Heath Galium, or Heath Bedstraw (*Galium saxatile*).—Strong-growing perennial weed which does not yield easily to treatment by artificials. We recommend the removal of individual patches as they become visible, and lightly covering the spots with lawn sand.

Lesser Hawkbit (*Leontodon hirtus*).—This perennial weed, bearing bright yellow flowers, grows freely in England and Ireland. In Scotland it is found only in the south-east. The use of lawn sand will generally effect its destruction, but the plant should be stabbed vertically to ensure the artificial reaching the root.

Mouse-ear Hawkweed (*Hieracium Pilosella*).—A perennial weed of creeping habit, with oblong leaves, white on the underside. As soon as detected in a lawn, each specimen should, if possible, be lifted by hand. The plant will also succumb to treatment by lawn sand, if pierced to enable the artificial to act on the roots, but occasionally a second application is necessary.

Annual Knawel (*Scleranthus annuus*).—If allowed to obtain a firm hold, this weed, which is generally found on light sandy soils, will quickly smother the finer grasses. The plants should be raked out or lifted by hand.

Field Madder (*Sherardia arvensis*).—A small prostrate annual plant which will quickly die out if prevented from seeding by close mowing.

Parsley Piert (*Alchemilla arvensis*).—Sometimes called 'Lady's Mantle,' as the fan-shaped leaves clasp the stem like an inverted mantle. This small annual weed should be raked out immediately the plant is noticed.

Procumbent Pearlwort (*Sagina procumbens*).—The dense grass-like appearance of this minute annual weed is very attractive and its presence in a lawn is not always objected

to. The plant seeds so sedulously as to become almost perennial. Cutting out, and replacing with good turf or sowing the bare spots with grass seeds, is the only satisfactory course for dealing with Pearlwort, although severe frost invariably kills the plant.

Plantain (*Plantago*).—Five varieties—viz. *P. major*, *P. media*, *P. lanceolata*, *P. maritima*, and *P. Coronopus*—are natives of this country. These can generally be destroyed by lawn sand placed on the crown of the weed, after piercing the plant vertically to give the sand access to the roots. Very strong plantains may survive the first application, but a second dose given immediately signs of life are visible, will prove fatal. The removal of the plants is a sure means of eradication, and for the purpose the 'Sutton' Weed-lifter is a most effective implement.

Self-heal (*Prunella vulgaris*) is generally found on moist soils and imperfectly drained land. The plant has a procumbent or creeping stem; stalked, ovate and nearly entire leaves, and purple flower. When once Self-heal has obtained entry to a lawn drastic measures are required to extirpate it. Only by boldly cutting out the patches, replacing with sound turf or stopping the holes and sowing seed, can this troublesome weed be got rid of. Where drainage is inefficient the matter should receive attention.

Shepherd's-purse (*Capsella Bursa-pastoris*).—One of the commonest annual weeds found in this country. On lawns regularly mown and receiving proper attention the plant should never be seen. And if it appears in a newly sown plot of grass Shepherd's-purse will die out under constant cutting. But where the kept grass merges into the wild garden, this annual may disseminate seed and cause a great deal of trouble. The plant has a long tap-root and can be drawn by hand without disturbing the surrounding soil.

Thyme-leaved Speedwell (*Veronica serpyllifolia*).—A perennial which is not amenable to any treatment by artificials. It is easy to remove some of the tough stems by raking out after rain, but remnants will renew the trouble, and the most satisfactory course is to cut out when a plant is detected.

Field Woodrush (*Luzula campestris*).—A perennial herb which grows freely in the dry pastures, heaths and woods of this country. The difference of opinion concerning the merits or demerits of the plant is very striking. Some owners of lawns regard it with favour, others strongly object to its appearance. To the latter we may say that Field Woodrush is extremely difficult to eradicate. Where two dressings of lawn sand, each at the rate of four ounces per square yard, applied at an interval of six weeks, fail to destroy it, the only remedy is removal by hand.

Annual Meadow Grass (*Poa annua*) is indigenous in all parts of the British Isles and is the too familiar pest of garden paths, hedgerows, roadsides, and of many other positions where 'it never would be missed.' In recent years it has been recommended for sowing on the lawns of London gardens and squares. The chief objection is that the flowering stems lie close to the ground, and they impart a greenish-yellow tint to the grass, which very much depreciates the appearance of a lawn. Seeds are shed in abundance, and are blown in all directions by the wind, besides being freely distributed by birds; so that where the plant has once gained a footing it cannot easily be got rid of. When the new crop springs up the young blades are extremely pleasing in colour, and to this fact the supposed value of this grass is no doubt attributable. A small quantity of seed is collected for botanical purposes, and this is quoted by the ounce at a high but not a profitable price. But another variety—*Poa compressa*—is mistakenly offered in quantity under the name of *Poa annua*. This is equally worthless, and is in fact simply a weed grass. Those who value a verdant lawn will do wisely in taking some trouble to remove by hand any specimens which may obtain entrance.

ANNUAL TOP-DRESSING

It has already been explained that in preparing the seed-bed for a lawn the soil must be put into a thoroughly fertile condition. Too often the initial preparation is considered sufficient for the life of a lawn. Judging from letters which reach us the popular opinion appears to be that when grass is established it will take care of itself, and that mowing and rolling are the only needful operations for maintaining fine turf in a healthy state. A moment's reflection will show the fallacy of this idea. Immediately the grass begins to grow the process of exhaustion commences. Crop after crop is cut and generally removed, the land is gradually impoverished until the plant becomes thin, and frequently weeds and moss appear in abundance. The deterioration of a lawn is always the direct result of neglect or mismanagement. Grass must be fed, just as other crops are fed, although it has to be done in a different way. The soil cannot be broken up and enriched, and there can be no change of crop. The work is limited entirely to the surface, and this makes the task very simple. But the fundamental fact to be recognised is that at least once a year lawns must be liberally top-dressed. When artificials are used the proper time for sowing them is February or March, and on many lawns one or two applications in liquid form given during summer will sustain the grass under drought.

On light soils, especially those of a sandy nature, something more than artificials is required. Sandy and gravelly soils are almost always wanting in humus, and to supply this deficiency from the surface takes a very long time. A thin coating of rotten stable manure, finely broken up, may be spread evenly over the lawn late in autumn. It should be occasionally stirred with a rake, and during the winter the dressing almost disappears. Perhaps even better results are obtained by the following method. Prepare a compost of thoroughly decayed manure and clean fine soil, mixed in equal parts. Pass the material through a $\frac{1}{4}$-inch mesh sieve and store in a dry place

for use as required. Apply in autumn and winter, putting on a further dressing immediately the preceding one has become assimilated. No single application should be heavy, but just sufficient to lightly cover the ground. The effect of these dressings will be augmented by a sowing of artificials at the end of February. As weed seeds are frequently introduced from the stable the young plants must be removed while quite small. Finely sifted leaf-soil is often preferable to manure. It is rich in humus and does not spoil the appearance of lawns.

Several artificials are favourable to grass, and these may be used alone or in combination. They can also be changed in alternate seasons in accordance with the character of the soil or as experience may dictate. The artificials usually employed are Peruvian guano, superphosphate of lime, various preparations of bone, rape meal, malt culms, sulphate of ammonia, sulphate of potash, and Sutton's Complete Grass Fertiliser. The last named is so rich in the constituents which are essential to the free growth and healthy appearance of fine grasses that it may be used more sparingly than some other artificials. As to the preparations of bone it must not be forgotten that these are favourable to the development of clover.

Nitrate of soda is sometimes advised for lawns, but it has the disadvantage of encouraging the stronger grasses. For agricultural purposes the value of this rapid and powerful stimulant is well understood. Basic slag and kainit are also sown over lawns, but we cannot recommend them. They both force a robust growth of clovers, and should never be employed where clovers are not wanted.

The quantity of artificials per acre depends on the character and condition of the soil and on the class of manure chosen. Two cwt. per acre is the minimum, but the quantity may be increased to five or six cwt., or even more.

The effect of all these manures is enhanced by admixture with sifted clean fertile soil in equal proportions. But where soil is difficult to obtain, or the presence of weed seeds is feared, the artificials, after being reduced to powder, can be

sown broadcast by hand. For a short time the grass may be slightly discoloured, but this soon disappears under the mower. On heavy ground the use of sharp sand, in the place of soil, is preferable.

Soot is frequently lauded as a dressing for lawns, but in this we are unable to concur. The value of this nitrogenous material is not disputed as an addition to poor light soil when preparing this class of land for a lawn. As a top-dressing to established grass, however, there are grave objections. Ladies' dresses may be ruined in a few minutes, and probably tennis players will have something to say concerning the blackening of balls.

The experiments on grass conducted at Rothamsted demonstrate that by a consistent system of manuring, continued for a number of years, the herbage on any kind of soil can be controlled. Fine grasses may be encouraged, strong-growing varieties discouraged, and clovers can be eliminated or made to grow luxuriantly, simply by the repeated use of selected manures.

IMPROVING LAWNS

Old lawns become thin and bare from various causes, such as poverty of the soil, the encroachment of weeds, overwear, and the near presence of trees and shrubs, or because the seeds originally sown were not suitable for the land. Unfortunately, the signs of deterioration are frequently disregarded until severe measures become necessary, involving much labour and outlay, part of which might easily have been spared by timely attention.

Although grass can have neither the advantage of change of ground nor the benefit of tillage, an improvement can generally be made by mechanical treatment of the surface, liberal top-dressing, and the sowing of renovating seeds. But the restoration of neglected lawns cannot be effected in a hurry. One, two or more seasons may be needed for destroying weeds from self-sown seeds, enriching the soil and thickening the plant of grass.

Scarifying the surface by a vigorous use of the rake is one means of improvement, and the work will be more effective after the lawn has been closely mown. The immediate result is apparent ruin, but the grass will speedily recover from the rough treatment and look the better for it. On a large lawn the work is quickly accomplished by a toothed harrow, heavily weighted, and drawn by a horse wearing boots. The entire area should be harrowed twice, in different directions.

This severe raking or harrowing though beneficial in itself, is not alone sufficient. All lawns need occasional applications of some good artificial, and there is no better dressing than Sutton's Complete Grass Fertiliser, with or without the addition of an equal quantity of rich loam or leaf-soil. For heavy retentive land clean sharp sand can be substituted for the loam or leaf-soil. The sand soon disappears and it improves the surface. Three cwt. of the fertiliser may be sufficient for an acre (equal to rather more than one ounce per square yard); but if the land has been long neglected, or is naturally poor, the quantity of the artificial should be increased to five cwt. per acre (about two ounces per square yard). Spread the dressing evenly over the lawn, lightly apply the rake, leave it for a few days, and then roll down.

Where the grass is thin renovating lawn seeds should be sown directly the weather is favourable. Run the mower over the lawn; follow with the rake, taking care to break the surface into a finely crumbled state; sow from half to one cwt. of seed per acre by two operations to ensure regular distribution; rake in, cover the seeds with a thin layer of finely sifted soil, and finish with the roller. The herbage should be quite dry at the time of sowing, or the seeds will cling to the wet grass and be wasted.

By some means birds should be deterred from consuming the seeds or destroying the rising plant, or all the sparrows of the district may be tempted to a feast. (See page 23.)

The proper time for commencing the work in spring depends on the district. In the southern and western counties of England and in Ireland a beginning may be made at the end of January or early in February, in suitable weather; and as

the old turf affords some protection to young grasses, seed can be sown about the middle of March in mild districts. For the midlands and the north the date will necessarily be later. The period for spring sowing usually extends into May, but it must be determined by the character of the season. Late spring or summer sowings of grass seeds, followed by weeks of hot dry weather, have no chance of developing a plant. The germs, after starting, are destroyed by drought.

The renovation of lawns, &c., may also be undertaken with advantage in August and September, and this period of the year is undoubtedly preferable to spring for dealing with turf which shows signs of wear after a season's play; the grasses from the newly sown seed then have an opportunity of becoming fairly established before the following summer. Every effort should be made to sow as early as possible in September. Seeding in October may occasionally prove successful, but it is not to be relied on. (See also a paragraph on autumn sowing, page 23.)

During the growing period the use of Sutton's Complete Grass Fertiliser need not be confined to one application, but may be employed as occasion requires, to stimulate the grasses through spring and summer. When the weather is hot and dry, a weak-growing sward may be invigorated by an application of the Complete Grass Fertiliser, at the rate of about one ounce per square yard. Evenly distribute the artificial over the grass and thoroughly water in. Evening is the best time for carrying out the work.

Powdered sulphate of ammonia may also be used with good effect on lawns which need a quick-acting stimulant. The usual quantity for a single application is one pound for thirty square yards, and during drought it should be employed in liquid form—one pound to ten gallons of water for every thirty square yards will help to maintain the turf in a verdant state. As a rule, however, forcing artificials such as sulphate of ammonia need to be followed later on by a dressing of natural manure compost or some compound fertiliser which will provide the grasses with plant food.

The proposal to use weed destroyer, worm destroyer, and artificial manures at the time of sowing seed is not at all uncommon. The entire destruction of the grass is almost certain to ensue and the germs of newly sown seed will also be killed.

Nearly all artificials when applied in the raw state produce a brown appearance for a time. After a moderate dressing the discoloured herbage is soon removed by the mower. But two or three applications of different artificials given simultaneously or in swift succession must prove fatal. Even a single dressing of Peruvian guano or of sulphate of ammonia at or near the time seeds are sown will prevent germination. Artificials should generally be raked in first, allowing an interval of about a fortnight before sowing seed. After sowing, artificials should not be employed until the young grass has passed beyond the tender stage of early growth.

Questions frequently arise as to the desirability of dressing lawns with manure in autumn and winter. So far as powerful stimulants, such as Peruvian guano and sulphate of ammonia are concerned, it must be remembered that they at once force a strong growth of grass, and this is not desirable during the season of rest. But Sutton's Complete Grass Fertiliser if applied in autumn or winter has a beneficial effect on root growth.

On dry sandy soils it is often an advantage to cover the grass with a thin layer of sifted leaf-soil, or thoroughly rotten stable manure, finely broken up, after the final mowing in November; stir the material occasionally with a rake, and sweep off any loose remnant before the first cutting in February. This dressing need not interfere with the application of artificials early in March.

Road-grit is commonly regarded as an excellent material for lawns, but those who give it a trial and observe the result are not likely to repeat the experiment. The grit is almost certain to introduce seeds of a number of pests, including *Hordeum*, which is far more difficult to eradicate than plantains, dandelions, or any of the large perennial weeds.

Sea sand can with marked advantage be applied to coarse lawns. It 'fines' the herbage and improves the surface, particularly of strong land. But any single dressing should not be heavy. The best results are obtained by giving monthly applications, and one cwt. of sand will suffice for an area of 400 square yards.

Newly made lawns, especially when hastily prepared, sometimes show depressions after the plant is visible. Where these depressions are shallow an occasional sifting of fine loam may follow the mowing, and with patient attention a true surface can be restored; but a quantity of soil, roughly thrown down, will smother the rising plant. Should the hollows be deep, a different procedure must be adopted. Young grass cannot be cut and rolled back in the manner usual with an established sward, and if hollow spots are filled with a thick covering of earth it is necessary to re-sow, following in due time with the mower and roller as already advised. But where the plant is fairly thick, it may perhaps be possible to cut the young turf in square sections, lifting each one separately by means of a sheet of zinc or thin flat board. After making good the level, the pieces of turf can, with care, be relaid without much injury. As a finish lightly touch the surface with the flat beater and spray over the grass a few cans of water.

Inequalities in old lawns can be remedied by a simpler mode of treatment. Across the sunk spot cut with an edging iron parallel lines in the grass, ten or twelve inches apart, making also one cut across the centre at right angles to the others; then use the turf cutter and roll back the turf from the centre. Make the bed perfectly level, leaving the soil with a firm but crumbled surface; carefully restore the turf, which will be found rather too long for the space, and gently compress it into position; beat down, give a soaking of water, and in due time mow and roll. In a few days no trace of the operation will be visible, but the grass ought not to be roughly used until it has taken firm hold of the soil.

Instances have been brought to our notice where the soil of a lawn has been rendered extremely hard as the result of using too heavy a roller, or of rolling the ground when in an unsuitable state. Constant traffic also will badly bind the surface soil. Such a condition prevents quick drainage, the soil remains cold through lack of aeration, and the growth of grass is consequently unhealthy. Loosening the soil is usually an effective remedy, and this can be accomplished by the aid of a five-tined fork driven in to a depth of, say, six inches. By gently depressing the handle of the implement the turf and soil will be slightly raised. If the operation is commenced at one corner of the lawn and continued by working backwards, the whole of the affected area can be systematically treated. Leave the ground untouched for a few weeks and then apply a dressing of Complete Grass Fertiliser incorporated with an equal amount of clean sand. Rake the compost in and follow with a light roller.

Lawns which have become sour should be dressed with about ten cwt. per acre of ground lime, and as a rule it is wise, after an interval of three or four weeks, to follow with Complete Grass Fertiliser or Peruvian guano, at the rate of three cwt. per acre.

Clovers are indigenous all over the Kingdom and we receive many inquiries as to the best means of destroying patches which appear in lawns. To deal with the plants individually entails a considerable amount of labour and may be only partially successful. A tap-rooted plant such as Hop Clover, or the Greater Birdsfoot Trefoil, can be cleared with little trouble; but White Clover and the small Yellow Suckling are not so easily disposed of. Occasional dressings of Sutton's Anti-clover Mixture at the rate of about two ounces per square yard will check the growth, and where necessary, running stems should first be raked up and closely cut off. Powdered sulphate of ammonia is also excellent for the purpose, and the proper quantity for a single application is half an ounce per square yard. More than this may discolour the grass for a short time. Three or four dressings can be given at intervals of a month or six weeks during summer, and in the event of hot dry weather the artificial should be applied in the evening and watered in.

Some seasons prove to be especially favourable to the development of clovers. The summers of 1911 and 1913 witnessed the appearance of the Yellow Suckling and White varieties on lawns where clovers had not previously been seen, and where no seed of any kind had been sown. On other lawns the clover almost crowded out the grasses until checked by autumn and winter. A strong growth of clovers may be discouraged by raking up and closely shaving each patch with a sharp scythe, followed by a thin dressing of Anti-clover Mixture, or powdered sulphate of ammonia. Repeat the cutting whenever the foliage of the clover is prominent and give further dressings of either of the artificials named, at intervals of about one month. In the absence of a man skilled in the use of a scythe, cranked shears may be substituted, although they considerably prolong the task.

We have occasionally been asked whether the herbage of a lawn which is thin might not be thickened by allowing the grasses to flower and shed seed. A more disastrous course could not be pursued. It has exactly the opposite effect to that desired, by weakening the standing plant. The little seed that is produced will be shed by the coarser varieties, and if these seeds take root in the lawn, the herbage will be deteriorated, and it may take years to remedy the injury.

Although trees and their shadows greatly enhance the charm of lawns, the pleasure they afford is not without its Nemesis. Trees impoverish the soil, partially or wholly shut out sunshine from the grass, and, in the case of Conifers, spines are shed that prove destructive to ground herbage. Rain as it drips from the foliage and branches is also disastrous in its effect. As a result of all these influences great difficulty is experienced in preventing the gradual disappearance of grass beneath or near trees. Poverty of soil can be remedied by regular top-dressings of artificials, and a dressing of lime every few years will help to prevent the ground from becoming sour. Fallen spines should be swept up. But few grasses will persistently resist the effect of dripping water, especially where sunshine is in a great measure excluded.

Certain varieties endure the shade of trees better than others, and we prepare a mixture of grasses which may stand for two or three seasons and sometimes longer. Still, the fact remains that under trees it is more or less difficult to keep the sward in good condition. In very unfavourable spots annual sowing may be the only satisfactory course. For small plots the cost is very trifling, and the bright green of the young plant is well worth the outlay and labour involved. The more expensive method of removing the top soil and laying down turf is often adopted, but it is seldom permanent. Grass brought from the open and laid in the shade generally dies within a year.

MOSS IN LAWNS

Many complaints reach us concerning lawns which are overgrown with moss, and we are asked to name a remedy. Well, the remedy depends on the cause. Moss may be troublesome because the soil is too poor and exhausted to support a crop of grass. This question has been discussed in the sections devoted to enriching soil and improving lawns. But moss appears frequently on lawns which are imperfectly drained, and here the remedy is obvious. As the work of draining seriously disfigures the place, other measures may be tried, and if these have occasionally to be repeated it may be preferable to the drastic course of laying in drain pipes, especially as a difficulty sometimes arises in disposing of the outflow. (See page 5.)

The moss destroyer originated by us is the simplest remedy that can be used. In dry weather distribute the powder evenly over the affected spots at the rate of one ounce per square yard. The moss will at once be destroyed and for a short period the grass may present the appearance of being scorched, but it quickly recovers and is all the better for the dressing. Bare spaces must be scarified and sown with suitable seeds after an interval of two or three weeks.

Another mode of treatment is to put the rake heavily over the sward, or, if the lawn be large enough, employ a toothed harrow to drag out as much moss as possible. Then rake in a dressing of ground lime, of which five cwt. per acre will usually suffice. About a fortnight later give an application of Sutton's Complete Grass Fertiliser—three to four cwt. per acre—previously incorporated with an equal amount of clean fertile soil, to stimulate the grasses. Follow with a sowing of seeds to fill the ground with young healthy plants and assist in preventing a reappearance of the moss. (See pages 44 to 46.)

It should be borne in mind, however, that where the encroachment of moss is due to the impoverished state of the soil, it will be necessary to top-dress regularly in spring and autumn with suitable manures until the surface is restored to a thoroughly fertile condition.

FUNGOID GROWTHS AND DISEASES

Fairy Rings are sometimes troublesome on lawns. They are caused by several kinds of fungi. When these decay, the soil becomes charged with nitrogenous matter, and a dark green growth of grass is the result. The mycelium exhausts the soil of the constituents which are essential to the existence of the fungi, and as new supplies of food can only be found on fresh ground, the original spot becomes a circle, which annually increases in circumference until it breaks up or the fungi become exhausted.

As a result of numerous experiments we have produced a preparation which will destroy the fungus and at the same time avoid injury to the grass. The powder must be spread not only over the ring but should be applied to the grass for at least one foot *outside* the ring, and it may be necessary to repeat the dressing two or three times at interval of a month, always in dry weather, before the unsightly marks disappear. Lawns that are badly infested may be treated over the whole area at the rate of three cwt. per acre ; this is equal to about one ounce per square yard.

Blackish Lichen.—The presence of this fungoid growth is generally attributable to lack of proper drainage, a condition which should at once be rectified. But where drainage is satisfactory the state of the soil may be improved by a dressing of ground lime, four pounds to every thirty square yards, evenly sown over the surface after raking out and removing the Lichen. A few days later again scarify and apply superphosphate of lime, two ounces per square yard. To thicken the herbage, grass seeds should be sown in favourable weather.

Red Gelatinous Mould (*Isaria fuciformis*).—Both lawn and pasture grasses are liable to attack by this disease, although it appears most frequently on the finer-growing varieties. The minute tufted fungus which is often bright in colour, ranging from pink to dark red, springs from the stems and leaves of grasses, joining them together in a seaweed-like mass. To prevent the disease from spreading, closely cut the affected herbage which must be removed and burned. An immediate dressing of one or two ounces per square yard of superphosphate of lime will be found beneficial.

Summer Rust consists of minute spores shed by the mycelium of *Puccinia graminis*, a fungoid disease which attacks the leaves of grasses and cereals. The spores increase with great rapidity until the foliage is covered with dust-like rust of an orange-red colour. Immediately the presence of Rust is noticed on a lawn the grass should be closely mown and the cuttings destroyed. Follow with an application of sulphate of potash over the entire lawn at the rate of about half an ounce per square yard.

LAWN PESTS

Ants are frequently a nuisance on lawns in the spring of the year, and the small red species is the chief culprit. The insects throw up heaps of fine soil in the night, and this is repeated until swarming takes place. It is easy to destroy them by dropping a mixture of Paris Green and sugar near

their runs. But as Paris Green is a poison, animal life must be considered. We recommend a simple remedy which entails no danger, but it must be followed up presistently. Purchase a few common sponges, as large as a man's fist. Dissolve one pound of Demerara sugar in two quarts of warm water. Immerse the sponges, wring out nearly all the liquid, and place them near the ant runs. Twice daily throw the sponges into hot water, and repeat the process until the ants are cleared.

Birds.—Suggestions for the protection of sown areas from the depredations of birds are given on pages 23 and 24.

Chafer-beetles, or White-grubs.—During recent years the damage to grass and other vegetation caused by the larvæ of Chafer-beetles, often called White-grubs, has considerably increased in this country. The grubs feed on the roots of the plants, inflicting great injury. Of the four species of Chafer-beetles, the Large Cockchafer (*Melolontha vulgaris*) and the Garden-chafer (*Phyllopertha horticola*) are especially destructive to the roots of grasses. Every opportunity should be taken to kill the beetles which are to be found on trees and shrubs in early summer. The larvæ may often be successfully trapped by placing pieces of turf, grass downwards, on the lawn. Stimulating manures should be applied to the grasses to encourage growth, and frequent rolling in suitable weather is also beneficial.

Daddy Longlegs, or Crane Fly (*Tipula oleracea*).—Extensive damage is sometimes done to grass by the larvæ of the Crane Fly or, as it is more familiarly named, Daddy Longlegs. The eggs, of which a single fly is capable of producing a very large number, are deposited in the turf in early autumn and are quickly hatched. The legless grub attains a length of about one and a half inches and is encased in a tough skin which has earned for it the name of 'leather-jacket.' These grubs descend to the roots of the grass on which they feed and their presence is soon demonstrated by the withered and discoloured appearance of the herbage. Much difficulty is often experienced in clearing the ground of 'leather-jackets.' Perhaps the safest and most successful method of eradication

is by the use of Worm Destroyer, which will bring the grubs to the surface when they can be collected and destroyed. Vaporite and Paris Green, the latter a strong poison, are also occasionally employed. It is an excellent practice to roll the turf late in the evening when the grubs are feeding, and this will crush large numbers, while the use of stimulating manures will strengthen the grasses against attack.

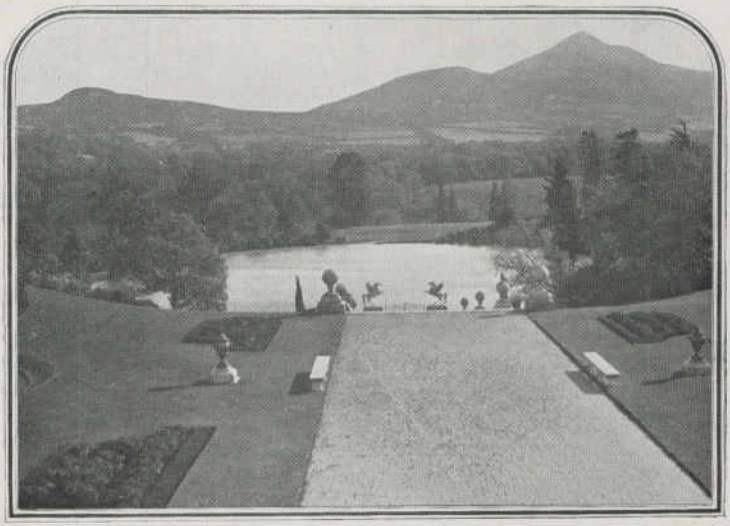
Earthworms.—Where earthworms are troublesome they may be destroyed in the manner described on page 26.

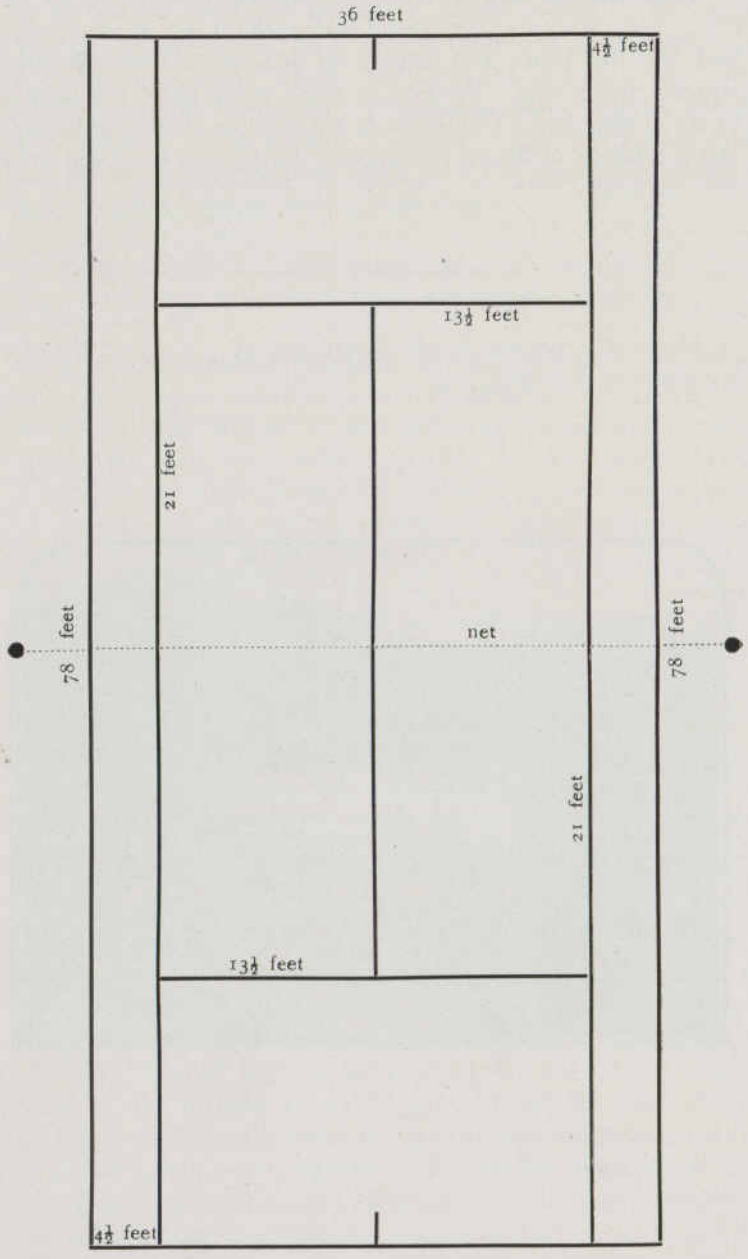
Stem Eel-worm (*Tylenchus devastatrix*) attacks the stems of certain grasses, causing a great deal of mischief. The minute worms are most difficult to exterminate even when land is under cultivation, and the trouble is greatly increased when turf is invaded. A mixture of sulphate of potash (3 cwt.) and sulphate of ammonia (1 cwt.) per acre sometimes proves effectual. This should be applied in showery weather.

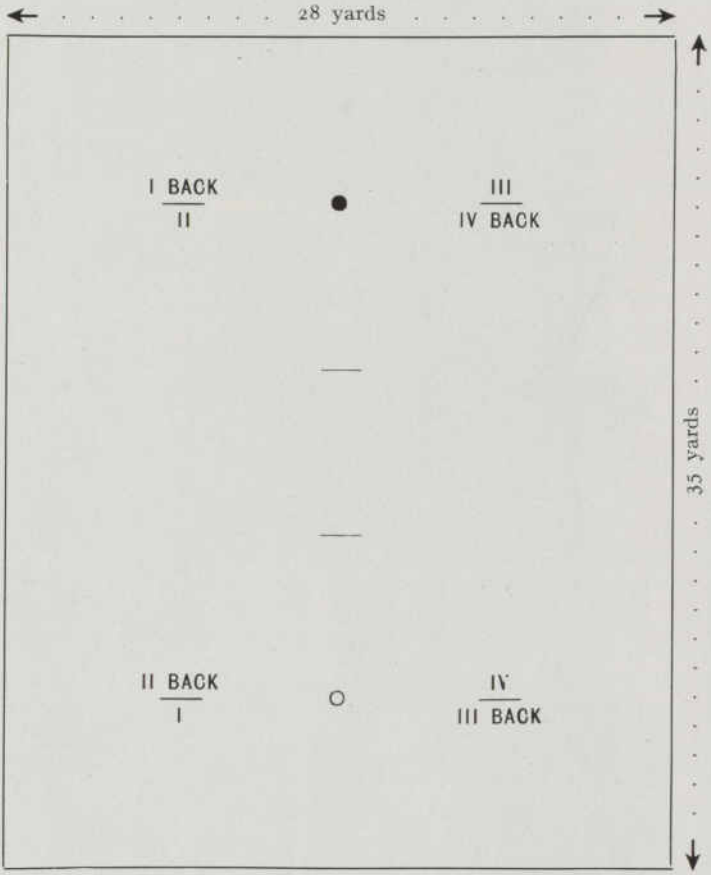
Moles.—Lawns which are in close proximity to fields or park land are liable to the incursions of these destructive creatures. Abundant evidence of the undesirable presence of these rodents in the ground is to be seen in the mounds of earth which they throw up at intervals, and immediate measures should be taken to effect their destruction. On a lawn, trapping is generally the surest and most convenient means of dealing with the mole, but the arrangements must be carried out by a man experienced in the work. As the creature's sense of smell is particularly keen, gloves should be worn to avoid touching the traps and the surrounding earth with the hand. Another method of extermination is by the use of a fumigator which we can supply for the purpose. Insert a fumer at the entrance to the run and another where the mole was apparently last at work. Should the run be a triangular one place a third fumer at the furthest traceable point. Light the fuses simultaneously and securely cover the spots to prevent the possibility of smoke escaping above ground. Poisons and noxious oils are occasionally resorted to, but these need handling with discrimination and care.

The Antler Moth (*Charæas graminis*).—The larvæ of the Antler Moth, which attain a length of about one inch, feed on the roots and shoots of grasses, thereby greatly injuring the plants. Rooks and some other birds are partial to the caterpillars. Rolling in favourable weather is beneficial, and a solution of lime-water applied during rain has been used with success.

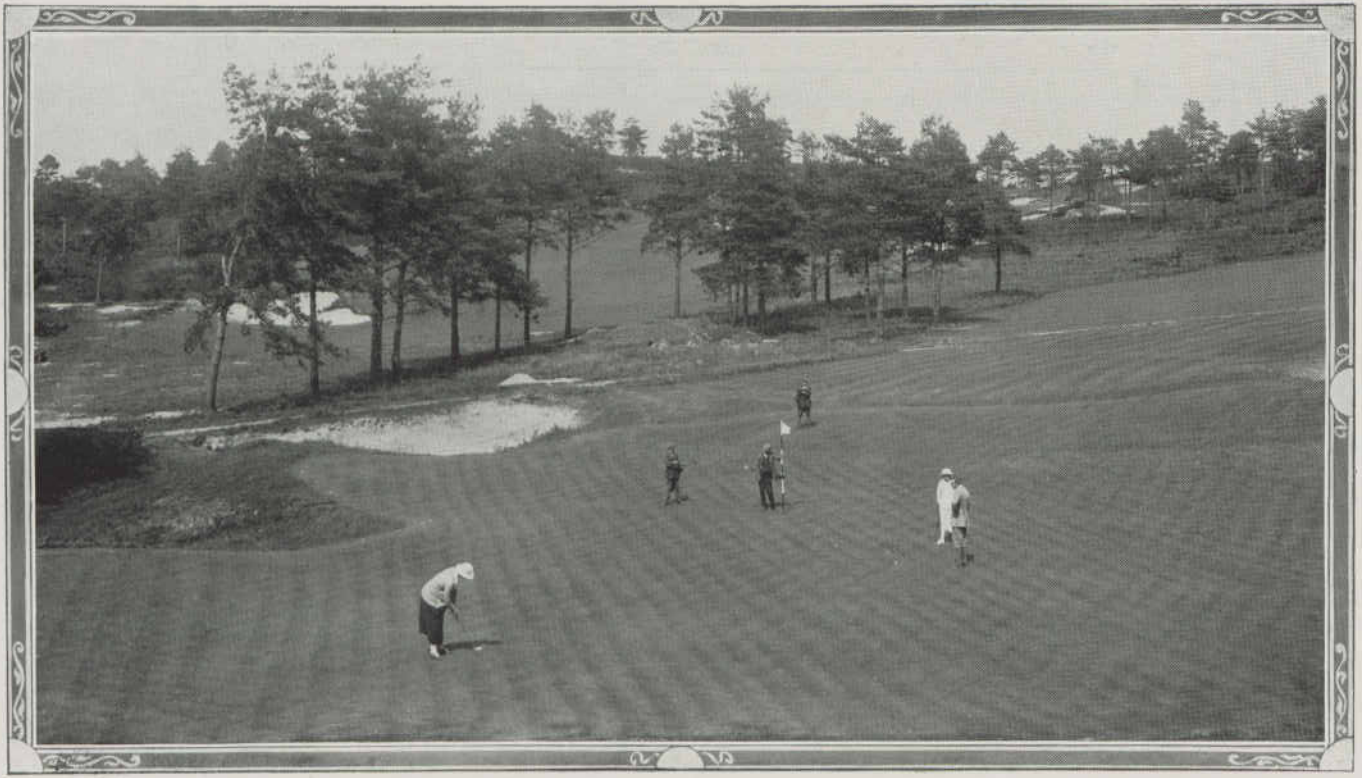
Plans of a double Tennis Court and of a Croquet Ground are given on following pages.




36 feet
4½ feet
13½ feet
21 feet
78 feet
net
78 feet
21 feet
13½ feet
4½ feet



MEASUREMENTS.—Pegs in centre line of ground 7 yards from nearest boundary ; hoops up centre line of ground 7 yards from peg and 7 yards apart ; corner hoops 7 yards from centre line and 7 yards from nearest boundaries.



SUNNINGDALE NEW GOLF COURSE.

PUTTING GREENS

Complete information on all matters connected with the creation and treatment of Golf Courses is given in "The Book of the Links," by Martin H. F. Sutton, F.L.S. See page ii.

No matter where Putting Greens are situated, or what the character of the soil may be, the grass should always be fine and dense, or it will fail to satisfy players. There is no difficulty at all in securing an ideal turf under ideal conditions of soil and climate. Unfortunately the conditions are often exceedingly unfavourable, and scarcely any two cases agree in all particulars. They differ in average rainfall, aspect and altitude, as well as in the nature of the soil and subsoil. The greens have to be formed with a limited number of fine grasses, each of which has affinities for certain soils. Hence it is necessary to exercise judgment not only in selecting the most suitable varieties, but also in determining their proportions. The texture of the herbage will eventually depend on the varieties of grasses sown and the percentage of each kind included in the mixture. This cannot be adjusted merely by relative weight, because no two varieties contain an equal number of seeds per pound.

As golf is played throughout the year, clovers, as a rule, should be avoided. The herbage is too soft and broad to stand hard wear, and the leaves hold moisture longer than grasses. Another objection to clovers is that the plant

partially disappears in winter, leaving the grasses thin on the ground. For these reasons the seeding should consist wholly of the fine grasses that are best adapted for continuous wear.

The usual procedure in preparing land for seed has been fully explained, and it must be borne in mind that small plots never favour economy of seed. To limit the quantity to the exact proportion required for an acre will probably result in an unequal plant and entail delay in using the green. As a rule, one ounce of seed should be allowed for each square yard. A dense even plant is wanted without loss of time, and to bring the sward into use on the earliest possible date the scythe or mower should top the grass while quite young. The roller must follow and be kept going whenever it can be used to advantage.

Before play commences it is most important to have putting greens in sound condition. They are seldom out of use for a sufficient time to permit of their being renovated, and although it is exceedingly difficult to restore the turf after the herbage has been badly worn, the attempt has often to be made. This will probably involve scarifying the turf, top-dressing with artificial manure, and about a fortnight later sowing renovating seeds. Suggestions on these points are offered on pages 44 to 46. After sowing seed, spread a thin dressing of rich loam evenly over the plot and roll down. Birds must be kept off, especially in early morning and in the evening, and players should be asked to use the greens tenderly for a time, so that the young grasses may have a chance of developing their roots.

On every golf course a nursery ought to be established from which turf can be cut for patching the greens, and the nursery should be formed by sowing a mixture of seeds identical with that from which the greens were produced. The grass will need exactly the same care and attention which is devoted to the greens, and every year a new plot must be sown to maintain a continuous supply. The surface to be made up with three or four inches of rich soil, finely sifted. Two or three years are required to mature a compact mat of roots fit

for cutting and relaying on the greens. For this purpose the usual quantity of seed will not answer. Sow not less than two ounces on each square yard of land. With constant mowing, rolling, and watering a really fine turf will be formed capable of enduring hard wear.

It should be considered part of the routine work to top-dress the putting greens regularly every spring. A good nitrogenous manure will stimulate the plant, impart a healthy colour to the grass, and do much to save repairs. It is important to use those manures only which especially favour the growth of the finer grasses. Sutton's Grass Fertiliser, which is a " complete " plant food, has given most satisfactory results on putting greens in all parts of the kingdom. A mixture of superphosphate of lime (three parts) and sulphate of ammonia (one part) is an excellent combination where the soil contains lime in sufficient quantity, and the best Peruvian Guano also answers well, especially on light soils.

Either of these fertilisers may be evenly sown over the greens, at the rate of about one ounce per square yard, and the effect will be augmented if the artificials are mixed with an equal quantity of leaf-soil. After the grass has been mown, spread the compost evenly, lightly rake in, and roll down. On poor soil a heavier dressing than that stated can be applied at the end of February or beginning of March, and two or three smaller dressings can follow at intervals of a month through the summer.

During dry hot weather the greens ought not to be so closely cut as to expose the hearts of the grasses to a scorching sun. When the mower is set low the herbage quickly becomes brown and unsightly. Perhaps it may be possible to water the greens in the evening ; if so, the benefit will be at once apparent. Clear lime water, dissolved sulphate of ammonia or any good nitrogenous manure, will answer, and it need not be strong. One pound in ten gallons of water will suffice for 30 square yards, and will help to keep the grass in order even in the height of summer.

The value of sea sand as a top-dressing cannot be over-estimated, especially for greens formed on rich or adhesive

soils. By its use the top soil is kept sweet and porous, a firm and true playing surface is ensured, while it has the further effect of ' fining ' the grass. The sand should be put on during autumn and winter, and monthly dressings of from one to two cwt. per green will prove far more effective than a single heavy application.

The real difficulty in maintaining putting greens in perfect condition arises from the fact that they get no rest. One remedy is obvious, and it is surprising that it is not more frequently adopted. Each green should be of a sufficient size to permit of one-half being closed for repairs. On some golf courses a still more satisfactory arrangement is made. The greens are duplicated, and this affords every facility for improving those which are undergoing the rest cure.

Worm casts are such a serious nuisance on putting greens that players naturally wish to have the worms destroyed. The method of accomplishing this is explained on page 26.

SOME OF THE EXPERIMENTAL GRASS PLOTS AT SUTTON'S TRIAL GROUNDS.

KENT v. WORCESTER, AT THE NEVILL GROUND, TUNBRIDGE WELLS.

CRICKET GROUNDS

THE observations on the preparation of land for lawns and tennis grounds, the sowing of suitable seeds in sufficient quantity, and the after-management of the sward, apply equally to cricket grounds. On these points we need not repeat instructions already given; nor are we concerned with certain other important questions which must engage the attention of club committees, such as the distance from populous centres, facilities of access, the form and extent of the land, and the character of the surrounding neighbourhood. But the nature of the soil, the importance of ensuring a perfect level for the wickets, and the finish of the ground, are strictly relevant to our subject.

The selection of a suitable site is seldom embarrassing, except as a choice of evils. An ideal cricket ground plays true under varying conditions of weather, although it may not be equally fast at all times. The soil does not break up and become rotten under fierce sunshine, nor need a passing shower stop the game. Indeed, land of the proper texture which is perfectly drained will bear, with merely temporary injury, the trampling of a crowd when the atmosphere is charged with moisture. The soils on which a satisfactory cricket pitch cannot be formed are sand and an impervious clay. On the former it is almost impossible to establish a plant of grass, and under rain the surface of the latter becomes sticky. But a well-tilled rich loam, especially when it is slightly tenacious, possesses all the qualities which favour the maintenance of fine perennial

grasses, and at the same time enables the groundsman to prepare a firm and true wicket.

To ensure a satisfactory turf for cricket, the soil must be capable of growing a full plant of grass developed by a healthy dense mat of roots. A sandy loam is too deficient in humus to do this. The result is that even after rain the pitch, as it rapidly dries, crumbles and becomes unreliable. No amount of rolling will bind a sandy soil into a firm surface capable of enduring the severe wear of a cricket match. Should there be no alternative site, it is imperative that soil of the character referred to be covered with several inches of stiff loam inclining to clay. Nottingham marl is often used for the purpose, and it certainly forms an admirable wearing surface. The marl is put on the ground before hard frost sets in. By spring it becomes disintegrated, and can then be evenly spread and rolled down. The porous subsoil ensures effectual drainage.

The thickness of the covering of marl and the extent of ground to be treated in the manner we recommend must be determined by the club purse. But during the progress of the work it is worth while to strain a point to make the playing square sufficiently large, say, at the very least, sixty yards in the line of the wickets by fifty yards in width.

Existing turf which readily crumbles is often marled with advantage. For this purpose the marl should be finely screened and applied in two or three instalments during the autumn and winter months. No single application should be so heavy as to more than just cover the surface, and when one dressing has disappeared another may be put on. About one cwt. in all will suffice for every thirty square yards.

A different course must be adopted with adhesive land which has to be rendered porous. Possibly a thorough system of drainage, carried out by an expert, may be most desirable; but this task should not be undertaken with a light heart. It is a costly business, and the trenches take a long time to settle down. After a field has been levelled and sown, it is exasperating to see broad lines of soil gradually sinking below the general level, to the

ruin of the ground for one or more seasons. As a rule, a good playing square can be established on clay by taking out the soil to about one foot in depth and replacing it with six or eight inches of mixed chalk and sandy loam. On the top, return sufficient of the original soil, broken very fine, with which should be incorporated enough sharp sand to prevent the wicket from becoming sticky under rain. Carefully beat down to ensure a perfect level, and finish off with the rake and roller. Making up the ground should commence in October, and the work ought to be completed before the end of November. In the absence of frost, February is the month in which the best results can be obtained from the heavy roller.

A slope is objectionable in many respects. It restricts the choice of a wicket, favours the hitting in one direction, and handicaps the bowlers. For these and other reasons a true level for the playing square is justly regarded as essential. But a gentle fall in the ground from all sides of the central square to the boundaries is not a disadvantage.

Whether the entire area, or only the playing square, shall be efficiently prepared generally resolves itself into a question of funds. Where the limitation is unavoidable, we need not waste arguments. But it must not be forgotten that, however excellent the playing square may be, unless the ball can travel evenly to the boundary first-class cricket is impossible. This fact is now recognised by comparatively small clubs, whose grounds are laid and kept with a precision that would have excited the admiration of county teams in years gone by. The club which is content with a well-made centre and an indifferent outfield deprives itself of matches such as every ardent lover of the game desires to witness. Whatever saving may be effected by limiting the outlay for labour or for seed to the playing square is almost certain to be regretted.

Apart from the ground, reserve plots should be sown and kept in the same condition as a fine lawn. From these plots turf can be cut to patch holes made by bowlers or batsmen. The treatment of a turf nursery is referred to under Putting Greens on page 62, and it is needless to repeat the instructions here.

Birds must be kept off a newly sown ground by some means. See page 23.

Except the final mowing and light rolling on the morning of the match, wickets should be prepared three days in advance. It is often fatal to good cricket to employ the heavy roller on the day the match commences. Should the grass be so dense as to make the wicket slow, a broom deftly used, followed by a hand mower, run several times between the wickets and across the ground also, will effect a marked improvement in the pace. The preparation can be finished with the small roller.

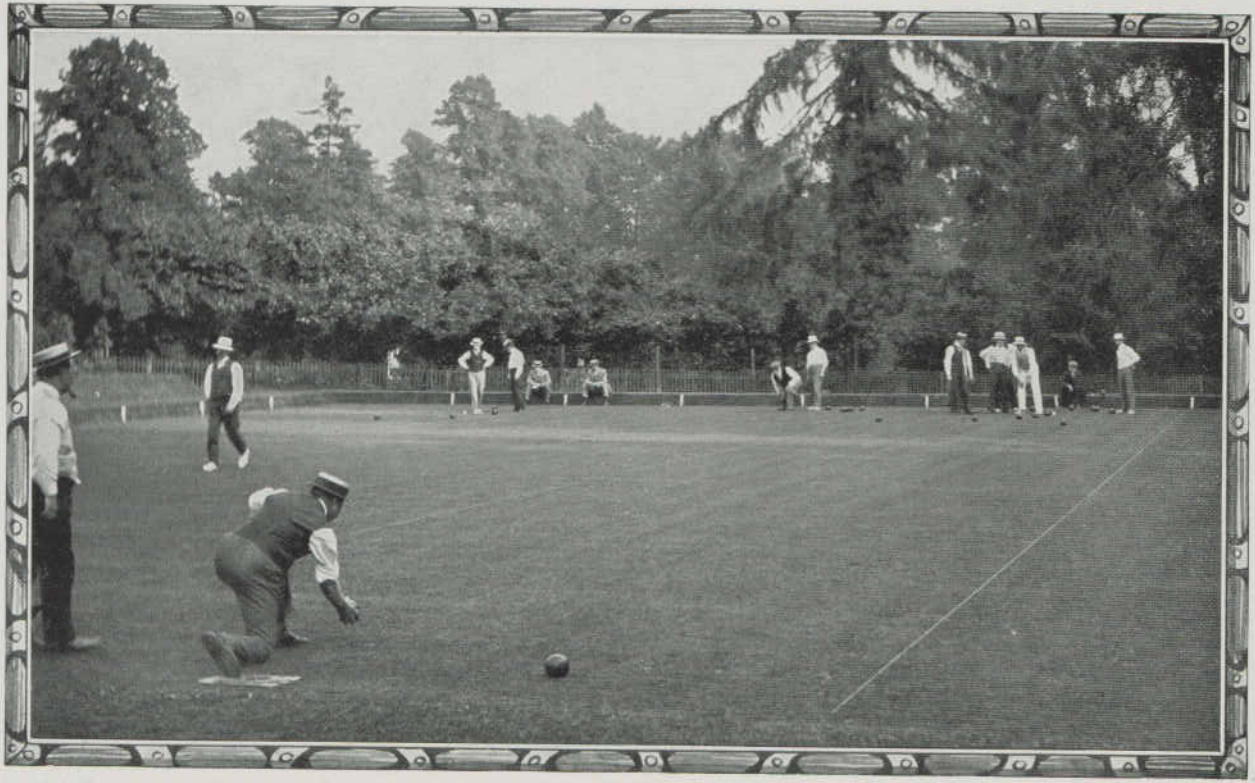
Plantains should never be tolerated on a cricket ground; when the ball happens to fall on the centre of one of these weeds it may travel in the most erratic manner.

On some grounds sheep are allowed to keep down the herbage, and if the animals are at the same time fed with cake, this is one of the simplest and most effectual means of maintaining the sward in a luxuriant condition. But on light land sheep may do immense mischief by uprooting the grass. Of course the work of mowing is greatly reduced when sheep can with safety be allowed to graze. It must, however, be distinctly understood that without cake sheep add nothing to the fertility of the soil.

As a rule every cricket ground should be liberally top-dressed in spring with the artificials recommended on page 42. And before or at the close of each season—certainly not later than the middle of September—fine grass seeds should be sown over the worn parts of the turf after making good with clean soil any inequalities in the surface, in accordance with the directions given for improving lawns. If the sowing can be made early in September, the grasses will have several weeks in which to become established before winter sets in, and for this reason sowing in autumn is generally preferable to sowing in spring.

A cricket pitch measures twenty-two yards in length. The popping crease should be marked four feet from the wicket and parallel to it; the length of the bowling crease should be eight feet eight inches.

BOURNVILLE VILLAGE CHILDREN'S FESTIVAL AT MESSRS. CADBURY'S GROUNDS.



BOWLING GREENS

With the ever-growing popularity of Bowls has arisen a widespread demand for first-class greens such as afford exponents of this ancient pastime every facility for cultivating a high standard of play.

Old-fashioned greens, particularly those in the North, were made with a ' crown,' or raised centre having gradually sloping sides. But the vast majority of greens constructed in recent years are of the dead-level type, and therefore it is with this style of green only that we propose to deal.

It may be well to state at the outset that the playing value of a bowling green must depend, in some degree, on the measure of the club's finances. To obtain the ideal surface, possessing the characteristic trueness and smooth-running of a billiard table, thoroughly firm, yet capable of being used immediately after a heavy summer shower, calls for somewhat elaborate and costly construction The first essential is effective drainage, for without this all else will fail to secure the perfect green. It will be necessary to prepare a foundation of porous material on which to build up the bed in readiness for sowing grass seeds or laying turf, and where the subsoil is at all heavy, or the natural drainage insufficient to quickly carry off the surface water, a system of drain-pipes must also be provided.

No less important is the question of seeding *versus* turfing the green. It is true that by the use of turf there is generally a small saving in the time required to establish a playing surface. But other factors have to be weighed. The use of ordinary turf cannot for a moment be considered ; and even if the very large outlay necessary for Silloth turf is no obstacle, the fact should not be overlooked that such turf when transferred from its natural habitat to other and less congenial surroundings is very liable to deteriorate in quality. On the other hand, a

prescription of grass seeds can be prepared to suit local conditions of soil and climate, and when established the grasses retain their natural characteristics, so long as the turf receives due attention. From the financial point of view, it may be accepted that the outlay for a liberal seeding will rarely exceed ten per cent. of the expenditure for Silloth turf, including rail carriage and cost of laying.

So much for the ideal green. But where expense is a vital consideration a really good green may be obtained by adopting, in a general way, the principles advocated in the earlier chapters for the formation of lawns, always provided there is efficient drainage of the ground.

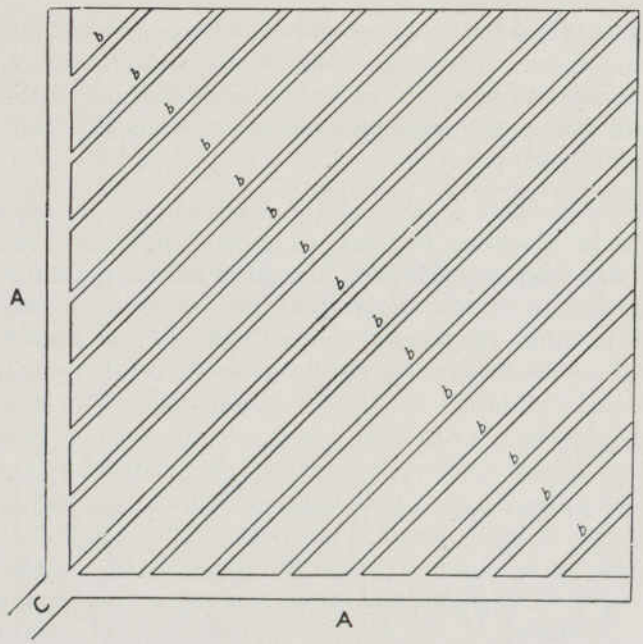
A full-sized bowling green measures 42 yards square and provides for six playing rinks. By the rules of the game a rink may measure not less than 19 nor more than 21 feet in width. Smaller greens may of course be formed, although for match play rinks within the dimensions given are essential. The full-sized green also allows the direction of play to be changed transversely immediately the extremities of the rinks in use show signs of wear. On all four sides, beyond the actual playing square, it is usual to form a ditch for holding any woods that may over-run the green. Twelve inches may be regarded as an average width, and the ditch should be filled with round shingle to within about an inch of the level of the turf. From the ditch banks rise to the surrounding level, where provision is generally made for those who desire to watch the play.

The first matter to be determined is the selection of a suitable site, and where a choice of ground exists the decision should (apart from such important features as accessibility and club accommodation) be largely governed by three main considerations—the natural drainage of the land, the amount of shelter from cold winds afforded by the immediate surroundings, and a plentiful supply of water for use during hot dry weather. On the first of these will depend, to no small extent, the outlay for artificial drainage. As to the need for protection from inclement winds, shelter is a *sine qua non* to enjoyable play, and where none exists it must be provided in the shape of a fence or quick-growing hedge. No well-drained green can be kept in good

condition during the burning summer months without an adequate water supply. Heavy rain will quickly vanish through the porous material of which the bed is composed, and after a few days of solar heat copious watering will be essential to maintain a verdant surface.

Assuming that a green of the maximum size is required, it will be necessary to mark off a true square of 126 feet each way, with an additional foot all round for the ditch. If the ground be already under turf, pare this off to a sufficient depth to ensure the removal of weed roots. Then examine the texture of the surface soil and ascertain its depth, as this will be needed to form the seed-bed at a later stage. The ideal soil for the purpose is a rich loam, but an adhesive soil may be made porous by the addition of any suitable gritty material, preferably clean sharp sand, while poor light soil will be benefited by an admixture of fertile loam. Pure clay is quite useless. If the top spit can be made serviceable for the seed-bed, dig this out to a depth of six inches and wheel away to a near convenient spot. Sufficient of the subsoil to make a total excavation of $2\frac{1}{2}$ feet in depth should then be taken out and discarded. Finish off the bottom evenly and test the general level by the method advised on page 9.

It will now be desirable to consider the question of drainage. We will take for example the case of a heavy subsoil. Here the use of pipes is imperative, and as a general rule the diagonal system illustrated in the sketch given overleaf is the best that can be adopted. Use four-inch pipes for the main drains, and two-and-a-half inch pipes for the branch drains. For the outlet six-inch pipes will be required. The rows for branch drains should be placed at a distance of about fifteen feet apart. Lay all pipes in shallow trenches and firmly fill in with clinkers, brick rubble, or stones. Allow the main drains a fall of about one foot in 120 feet, and the branch drains one foot in 100 feet. The direction of the fall and the position of the outflow will be governed by the means available for the disposal of the water, but where no natural outlet exists provision must be made in the form of a well or sink-away in the lowest part of the ground outside the area of the green. (See also pages 5 and 6.)



METHOD OF DRAINING A BOWLING GREEN.
A. Main drains: 4-inch pipes.
B. Branch drains: 2½-inch pipes.
C. Outlet: 6-inch pipes.

For less heavy land than that just described the distance between the rows for the branch drains may be increased to about twenty feet, but there should be no modification in the sizes of the pipes. On light and gravelly soils pipes may be dispensed with, and in such instances a trench dug on all four sides of the excavated square, one foot wide and the same in depth, and filled in with stones, broken bricks, &c., will be all-sufficient.

Before proceeding with the formation of the bed the water supply should be laid on, and it will be found a great convenience to have a service available on opposite sides of the green.

At this stage the area of the playing square must also be clearly defined. Carefully measure off 126 feet each way and fix the corners by driving in stout square wooden stakes, which should stand 18 inches above the excavated level. With the aid of

a garden line other stakes may be set at intervals of about six feet to indicate the four sides. If thus far the work has been accurately done, there should be a margin of precisely one foot all round for the ditch.

The surface of the completed green should be one foot below the surrounding level. This leaves a matter of 18 inches for building up the bed, which should consist of 12 inches of porous material with six inches of clean fertile soil at top. Clinkers make the best foundation. Place the largest at the bottom and gradually grade them to a small size as the task proceeds. Ram and roll each layer firmly into position, and when about nine inches have been built up add an inch of coke breeze or ground clinkers. Copious watering and the use of the heavy roller will consolidate the bed and prevent future sinkage. Complete the required height of twelve inches with a layer of clean sharp sand, perfectly free from any trace of clay, and again freely water to obtain a firm surface. It is of the utmost importance that the general level be once more tested and any discrepancy made good.

The next operation is to make the ditch by securely fastening stout boards to the wooden stakes previously inserted in the ground to define the boundary lines. Place the boards on edge and flush with the tops of the stakes. Fill in the space between the boards and the banks with stones or coarse gravel, leaving sufficient room for the top covering of shingle. The banks which surround the ditch should be almost perpendicular. In due course cover these with the best turf procurable, which, however, must be free from weeds of any kind.

Now return the top soil to form the seed-bed. Carefully examine each load for the removal of large stones, roots of weeds, and any other undesirable matter ; indeed, the top inch should be entirely free from stones. Spread each layer evenly and tread firmly down. When the requisite height has been reached, test the surface with the spirit level, and rake and roll until a dead level all over has been obtained. The instructions as to enriching the soil, given under lawns, apply equally to bowling greens, and this operation should be completed at least a few

weeks in advance of sowing time in order that any inequalities in the surface may be rectified.

In considering the most suitable period for sowing the grass seeds it must be borne in mind that the seed-bed of a bowling green, specially constructed on the lines we have indicated, differs very materially from that of the majority of lawns. The drainage is so free that after a period of hot dry weather, such as is often experienced in spring, the surface soil becomes so dry that germination of the seed is arrested. It is then necessary to resort to artificial watering, with the consequent risk of damage to the face of the green from the traffic. In September, however, the ground is generally warm and moist enough to ensure quick germination, and under favourable conditions the young plant will be fit for mowing a few times before winter stops growth. Where circumstances permit, therefore, preference should be given to autumn sowing, and if the constructional work can be completed in spring there will be the further advantage of a summer fallow which will allow of the thorough consolidation of the bed and the destruction of any weeds that may appear.

For a full-sized green one cwt. of grass seed should be regarded as the minimum quantity, and the outlay for a further half-cwt. will be well repaid in the greater density and durability of the playing surface. On no account should clover be included in the prescription. Detailed directions for sowing the seed and the treatment of the young plant will be found in the earlier chapters dealing with lawns, and here we have only to emphasise the importance of guarding against any disturbance of the true level. If after the first few times of mowing and rolling some trifling depressions are observed, these should at once be made good by the addition of a little clean fine soil. The keenest possible outlook must also be kept for indigenous weeds. Immediately the presence of one is discovered it should be bodily removed, for not a single weed can be tolerated on a first-class green.

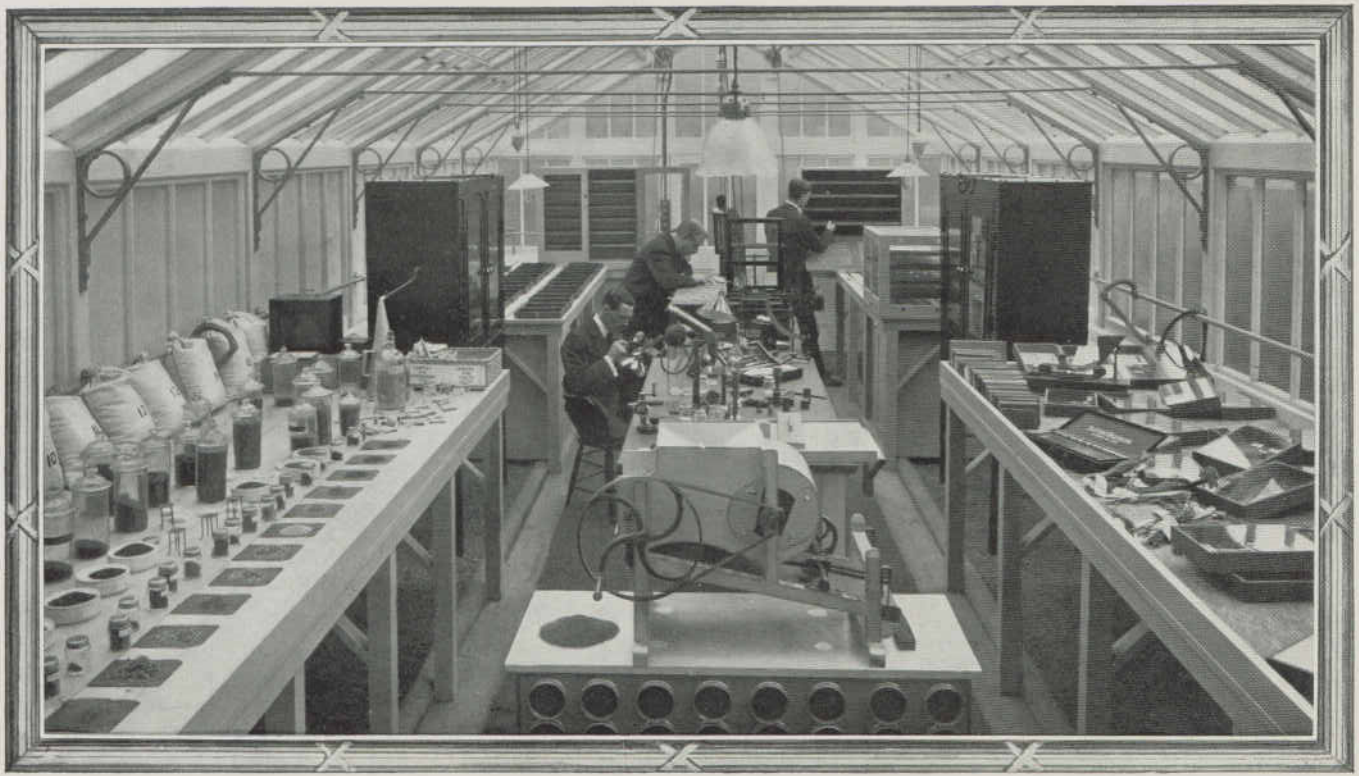
It is almost unnecessary to remark that a true and even playing surface will depend in no small measure on the discriminate use of the mower and roller. When the grasses are growing freely it may be desirable to run the machine over

the green every other day, each cutting to be followed by a roller of medium weight. But in the height of summer there will generally be less need for such frequent mowing, and as the bulk of herbage decreases under a scorching sun the cutters should be raised a little. A wooden roller, such as is employed on putting greens, will give a finishing touch to the rinks if used just before play commences. The heavy roller need only be put on occasionally, and the effect of this implement is most beneficial after a shower.

In the general upkeep of a bowling green special attention must be paid to top-dressing. Under the influence of rapid drainage, as well as constant watering during dry summer weather, the surface soil is quickly divested of plant food, and unless further supplies are forthcoming the grasses soon deteriorate and moss and weeds encroach. To encourage root-growth during the winter months give a dressing of Sutton's Complete Grass Fertiliser immediately play ceases in autumn. For a full-sized green two cwt. of the artificial will suffice and it should be mixed with twice the bulk of sea sand before being lightly raked in. In March another application of two cwt. of the Grass Fertiliser should be given, either alone or mixed with a little sea sand, and should the grass appear to need help during the playing season use in the evening half an ounce of the same artificial per square yard and well water in.

After a season's play it is only to be expected that the sides of the green, where the traffic is always heaviest, will show signs of wear. Any thin or bare places should be liberally sown with seeds in autumn in order that the grass may become established by the following summer. Players are naturally averse to surrendering the green so long as favourable weather lasts, but for the future welfare of the turf play should cease before the end of September to allow of the necessary repairs being carried out.

Greens which have a basis of clinkers or other porous material are rarely infested with earthworms, but where no such protective foundation exists the casts often prove very troublesome. To effectually eradicate the worms apply Sutton's Worm Destroyer, as directed on page 26.



ONE OF SUTTON'S SEED-TESTING LABORATORIES.

Implements necessary for keeping turf in good condition.

A Rake. B Fork. C Turfing Iron. D Edging Iron. E Roller.
F Shears. G Daisy Drawer. H Edging Shears.
PRICES ON APPLICATION.

THE SUTTON MOWERS. COPYRIGHT S. & S.

Width of Cutter from 8 to 24 inches. LIST AND PRICES ON APPLICATION.
Larger machines for pony or horse power can be supplied.

THE BOOK OF THE LINKS.

A SYMPOSIUM ON GOLF.

By MARTIN H. F. SUTTON, F.L.S.

An authoritative book dealing with every aspect of Golf Clubs and Links—the Practical, the Business, the Social. Each phase is exhaustively treated by the expert most competent to handle it effectively.

SUMMARY OF CONTENTS.

Profusely illustrated with Photographs. **Cartoons by Tom Wilkinson.**

Royal 8vo. Price 15s. net.

Of all Booksellers,
or direct from SUTTON & SONS, READING.

The Culture of Vegetables and Flowers

FROM SEEDS AND ROOTS.

By SUTTON & SONS.

Latest Edition. Price **10**s. **6**d. net.

'I think your book is perfectly excellent. I have had several books on gardening, supposed to tell one everything, but yours is the first I have found that really does so.'—**Mrs. KING, Cambridge.**

'I have your book, "The Culture of Vegetables and Flowers," and it was the perusal of that most practical and lucid work which encouraged me to take up gardening seriously.'—**REGINALD S. DRURY, Esq., Full Sutton Hall.**

'I feel that I must write and express my delight with your book, "The Culture of Vegetables and Flowers." Many a valuable hint have I gathered from the perusal of its pages, and I always feel imbued with fresh zeal and resolves after reading it.'—**JOHN B. C. SEAGER, Esq., Pons a Verran.**

'Your Book on Gardening is very practical, clear, and concise, and far ahead of any other volume on the subject. It should be in the hands of every lover of a garden, as it points the way to success.'—**Mr. L. C. PHILPOTT, Folkestone.**

'The volume is recognised as a competent guide in all matters pertaining to the important subject with which it deals, and growers of vegetables and flowers may consult it with confidence.'—**THE TIMES.**

'A solid volume of over 450 printed pages full of the most instructive information presented in such a lucid manner that the veriest amateur can follow and be made to understand how easy it is to fill both his utility and decorative garden with satisfactory results. The contents seem to embrace every department cropped or decorated by plants from seeds.'—**DAILY TELEGRAPH.**

'The term "intensive" as applied to gardening, simply means thorough or high class. Intensive culture is found as well represented in our best gardens as in French gardens. . . . . If you obtained "The Culture of Vegetables and Flowers from Seeds and Roots" from Sutton & Sons, Reading, you would have the best possible instruction in what may be termed high-class culture of vegetables to be found in any book.'—**THE GARDEN.**

'The large and growing class of amateurs who attend to their own gardens with, perhaps, a little almost unskilled paid help, could desire nothing more lucid for their guidance.'—**THE QUEEN.**

May be obtained direct from SUTTON & SONS, READING;

Or through all Booksellers, from the Publishers,

SIMPKIN, MARSHALL, HAMILTON, KENT & CO., LTD., LONDON.