1-1-1964

Lawns : their establishment and management

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LAWNS — Their establishment and management

By H. G. ELLIOTT, Dip. Agric., Assistant Chief, Dairying Division, and F. E. RYAN, B.Sc. (Agric.) (Hons.), Agrostologist

THERE is nothing more pleasing to the eye than a well kept lawn, be it in a home garden or covering a sporting area, and under Western Australian conditions there is no reason why a good lawn or turf cannot be developed and maintained—always provided that there is enough water and proper care and attention.

Three major factors control the growth of good lawns. These are climate, soil and management. Each of these is responsible for a series of direct effects on the growth and quality of turf grasses.

The growing and maintaining of a good turf on playing areas requires a thorough knowledge of the relationship and response of grass to the environment and the way in which it is handled. This knowledge must be adjusted to the demands of play—which unfortunately are directly opposite to what is best for the grass.

For example, compacting the area with implements, and play under unfavourable conditions, close cutting, scarring and damage by players may necessitate wide modifications of maintenance practices to compensate for the injurious effects. Always remember that it costs nearly as much to keep a poor lawn as it does a good one.

CLIMATE

In the southern part of the State the climate is Mediterranean with winter rain and acute summer drought. The most important factors determining the selection of species are temperature and soil moisture in summer and winter.

With severe summer drought irrigation is necessary and normally provided on any intensively used lawn area. Winter rainfall is often excessive but may be overcome by drainage.

Summer temperatures are generally high over most of the State and this eliminates some temperate species; but on the south coast milder summer temperatures permit these species to be grown. Winter temperatures are mild near the coast but more severe inland. In the metropolitan and coastal districts winter temperatures are not low enough to exclude sub-tropical species.

SPECIES

The coarser types of lawn grasses such as Buffalo, Kikuyu and couch grow reasonably well with some irrigation. In most areas including the dry inland districts, coastal regions and in the lower South-West they provide excellent lawn areas. The finer types such as bent, fescue and blue grasses are successfully grown in the higher rainfall areas of the lower South-West but need much more care and attention if grown in the metropolitan area or in the hot dry inland districts.

Generally the lawn species may be divided into four main groups.

1. Coarse—
   Buffalo.
   Kikuyu.

2. Medium—
   Couch.
   Blue Grasses.

3. Fine—
   Brown Top.
   Bent Grasses.
   Fescues.

*Revised from article Lawns by H. G. Elliott.
4. Others—
Canada Blue.
Carpet Grass.
Ryegrass, etc.

Buffalo Grass
(*Stenotaphrum secundatum*)

Buffalo grass is one of the coarsest of lawn grasses but is more widely used as a household lawn grass than any other, especially in the metropolitan area.

It is a vigorous grower spreading rapidly by above-ground runners and is adapted to the light sandy soils of the coastal regions. Because of its surface runners this grass rarely encroaches on garden beds unless neglected.

Buffalo grass has proved itself fairly foolproof for the average household lawn since it will stand up to a lot of abuse without serious deterioration. Even if it is neglected for long periods it can be brought under control more easily than most grasses.

During summer it needs watering and fertiliser, and during the growing season should be cut at regular intervals to prevent seed head formation and long upright growth. Moderately close cutting is preferred to prevent the lawn from becoming spongy. If not managed well this species tends to lose its green colour in winter and become practically dormant. It is relatively free from disease and insect pests.

Couch Grass
(*Cynodon dactylon*)

There are many variants of this grass ranging from very coarse upright growers to fine textured creeping types. Generally the American line, Bermuda, is recommended for sowing as seed or planted as runners. Apart from this a number of fine stemmed densely leafed types occur in local playing fields which are favoured for lawn planting.

Couch grass is well known in the metropolitan area and is generally used for large lawns, tennis courts, ovals, bowling greens, etc., in W.A. It is a vigorous grower in the summer and if suitably stimulated will keep growing during the cooler months of winter providing a green lawn all the year round.

Couch produces underground as well as surface runners and is therefore much

Golf putting greens receive all-year-round wear and tear and require good management to keep them in top condition. Most putting greens in W.A. are planted with couch grass
harder to keep in check than buffalo grass; but providing a good clean vertically cut edge is maintained, spreading onto other areas and into flower beds can be controlled.

Superfine Couch
(Cynodon transvaalensis)

Superfine couch is a fine type of lawn grass with mainly above-ground runners. It was extensively used for home lawns a few years ago. This grass has many disadvantages which show up after a few years and is not recommended.

Kikuyu
(Pennisetum clandestinum)

Kikuyu is not popular in the sandy soils of the metropolitan area because under ideal conditions it is an extremely vigorous grower during the warmer months of the year. It spreads by above and underground runners and one strain produces seed. However, when it is well managed and cared for, it will make an excellent lawn. It is used on some playing fields, especially for rugby and is the principal grass of the W.A. Turf Club for its racing tracks.

Kentucky Blue Grass
(Poa pratensis)

Kentucky blue grass is gradually gaining popularity as it is an extremely attractive lawn when well cared for after establishment. There are several strains available and it can be propagated by seed. It is capable of all-year-round growth provided it is properly managed and fertilised. It is not subject to many disease and insect pests and will grow on a wide range of soils but prefers neutral or limestone types.

Merian Blue
(Poa pratensis)

Merian blue grass is not as well known as the other grasses but is similar to Kentucky blue in habit and growth. It is particularly attractive and does best on heavy soils. It is slower spreading than Kentucky blue but forms a very dense sod once it completely covers the soil.

Queensland Blue Grass
(Digitaria didactyla)

Queensland blue grass has gained some prominence and popularity over the last few years. It is propagated by runners and rooted cuttings and seed is not available. When fully covered this grass makes quite an attractive lawn during the warmer periods of the year. The main disadvantage is its inability to withstand frosts or grow in the cold and wet time of the year. It becomes unattractive during this time.

Fine Grasses

Bent Grasses

Creeping Bent (Agrostis palustis) produces creeping stems which will root and shoot at each joint. Because of this it produces a dense cover and requires close and constant cutting. It grows on a wide variety of soil but does best in the more southern parts of the State. It is susceptible to high summer temperatures.

Velvet Bent (Agrostis canina) is also grown as well as the seaside strain of creeping bent.

Brown Top or Colonial Bent (Agrostis tenuis) is probably the most widely used type for household lawns when a soft fine grass is required. Seed comes from New Zealand and the grass is semi-tufted without surface runners. Dryland brown top is usually regarded as the better grass for local conditions as it has well developed underground runners and is better able to withstand drier conditions than the ordinary brown top. However both are susceptible to high summer temperatures.

Fescues

Chewings (Festuca rubra). A very narrow leaved, fine turf grass producing numerous erect growing leaves—tufted and does not creep, propagated from seed either of New Zealand or Australian origin. This grass is not usually sown on its own. One of its special virtues is that it will grow well with the bent grasses. Its erect leaves act like a carpet and give a lawn density and depth. There is a creeping type known as creeping red fescue with well developed underground rootstock which will make quite a good lawn but with a slow growth rate.
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Other Lawn Types

There are many of these, some of which may be suitable under certain circumstances and may act as annuals. Probably the best of them would be Canada blue grass (*Poa compressa*), carpet grass (*Axanopus affinis*), ryegrass (*Lolium perenne*), Japanese lawn grass (*Zoysia japonica*), manila grass (*Zoysia matrella*), and red top (*Agrostis alba*).

**SOIL**

Because climatic conditions can be controlled to a limited extent only, the relationship of soil to the growing grasses assumes major importance. The soil conditions may and can be modified or altered to an extent that will make them suitable for turf production.

For instance fertiliser applications will make certain nutrients available; acidity can be corrected by lime applications, and drainage, cultivation and the use of organic materials improves the physical conditions of the soil. Soil moisture is increased by watering. The addition of good loam to sand or vice versa will improve the soil texture, and the soil can be effectively aerated with suitable implements.

The most satisfactory conditions for all species of turf grasses are fertile soils that are permeable and well-drained but with good water-holding capacity where the roots function. However, if the correct choice of a grass is made, a good lawn or turf can be produced under a wide range of conditions because most difficulties and deficiencies can be overcome with correct treatment.

**MANAGEMENT**

Management covers establishment, maintenance and renovation. Good management consists of a thorough knowledge and practise of planting, clipping, fertilising, watering, rolling, aerating and top-dressing. The production of a good lawn or playing turf is a practical job. But to provide the answers to the many lawn problems much research work is needed and the knowledge already gained passed on to those most vitally interested.

**BASIC SOIL FACTORS NECESSARY FOR GOOD LAWNS**

These are:

1. Well-prepared seed bed. This is essential for all grasses. The seed bed should be firm and fine in texture.
2. The soil should be well-drained and not excessively compacted. This allows good aeration—grass roots need air for healthy, vigorous growth.
3. The ground should have a good moisture-holding capacity even where irrigation is practised—excessive drying-out must be avoided.
4. The fertility of the soil should be adequate as it must supply plant food throughout the year. Good soil fertility and an efficient fertilising programme must be maintained for the needs of the grass.
5. Freedom from harmful chemicals in the soil is necessary. Salt, and high acidity or alkalinity must be corrected to grow good turf.

**FERTILISER**

Correct fertilising is one of the most important factors in turf management. For maintenance of good turf under our climatic conditions, attention must be given to the type of fertiliser, the quantity used and the times of application to meet the needs of different grass species during the year. It is important to provide fertilisers for root growth at suitable times as well as leaf and runner growth.

Fertilisers contain one or more of three important elements nitrogen, phosphorus and potassium. These are in the form of chemical compounds combined with other elements. Some of these such as sulphur are also important plant nutrients. They may be natural or manufactured products or simply by-products of other processes. Generally they are classified as organic or inorganic fertilisers.

Inorganic or chemical fertilisers in general are water soluble and quickly available. For the establishment of a lawn a mixture consisting of—
7 parts by weight sulphate of ammonia.
4 parts by weight superphosphate (22 per cent.).
1 part by weight muriate of potash.

is an excellent one but on poor sandy sites and, on areas very low in soil organic matter some organic fertiliser is preferred. A mixture consisting of—

3 parts by weight blood and bone.
6 parts by weight sulphate of ammonia.
2 parts by weight superphosphate (22 per cent.).
1 part by weight muriate of potash.

is used at a rate of 3 oz. per square yard.

In the metropolitan area, where top soil is removed during levelling, still greater quantities of organic matter are needed and an initial application of 3 oz. per square yard of blood and bone is used besides the inorganic mixture given above.

Fertiliser firms provide special mixtures for certain agricultural crops and also for lawns. It is important to distinguish between mixtures designed for crops and those designed for lawns. The requirements of lawns and turfs are different from those of certain crops such as potatoes and even different lawn areas have different requirements. This also applies with different species of grasses—couch and creeping bent grasses require constant and liberal supplies of quickly available nitrogen but chewings fescue will do well on limited amounts.

When the lawn has been established a general recommended mixture consists of—

3 parts by weight sulphate of ammonia.
1 part by weight superphosphate.
1 part by weight muriate of potash.

On an established lawn the use of organic fertiliser is not recommended but for those who want to use some organic fertiliser this mixture is suggested—

12 parts by weight blood and bone.
34 parts by weight sulphate of ammonia.
6 parts by weight superphosphate.
13 parts by weight muriate of potash.

These mixtures are used on lawns at rates and times suitable for the particular turf. For most household lawns the 3 : 1 : 1 mixture is applied in two main applications, one early in autumn at the rate of 1½ to 2 oz. per square yard and the second in early spring at the rate of 1 to 1½ oz. per square yard. On some intensively used greens the same mixture is used at the rate of ½ oz. per square yard per month—equivalent to 16 cwt. per acre per year.

**LIME**

Soil acidity or alkalinity directly affects the health and vigour of lawn grasses, and can also, owing to its influence on the availability of plant foods, indirectly affect growth. Periodic applications of lime based on pH tests is the best way to avoid excessive acidity, but as a general rule home lawns do not require much attention in this respect. On those areas where it is needed, the best time for the application of lime is in the late autumn or winter.

On some coastal soils which consist mainly of lime sands it may be necessary for good grass colour to use both sulphate of iron and manganese at the rate of 4 to 5 lb. per 100 lb. of the fertiliser being used. Trace elements copper and zinc are essential and are generally in minor quantities in most commercial lawn fertiliser mixtures.

**CAUSES OF DAMAGE TO LAWNS**

**Cutting**

*The Mower*

The selection of a mower is one of individual liking, but whatever type is finally obtained it must be kept in perfect condition and adjustment. Incorrectly adjusted reels and rollers or uneven wheel height on either a reel or rotary type of mower will result in damage to the turf and unsightly unevenness in cutting.

Cut burns are not an uncommon sight and are due to the tearing, shreading and splitting of the grass leaves and stems due to blunt or dull blades on rotary or reel type mowers.

**Height of Cut**

Mowing is one of the least understood and most abused management practices on lawns. Extremely short cutting of all grasses should be avoided and generally cutting to 1 to 1½ in. is sufficient for most lawns. Couch grass on bowling greens is
cut much shorter than other lawn areas and this can only be practiced during summer. Sudden changes in cutting height should be avoided and when it is decided to reduce the height of cutting this should be done gradually.

Constant close cutting reduces the area of leaf surface available for gathering food material. About 90 per cent. of the dry matter of plants is obtained from the air and excessive defoliation starves the plant and reduces and weakens the root system. At any height of cutting the aim must be to keep a complete leaf cover over the ground.

Frequency of Cutting

Never allow lawns to become too rank or high. With the finer types of lawn grasses cutting at least every seven days is required. With the coarser types of grasses such as buffalo, couch and kikuyu cutting times should be regulated to growth. This may mean weekly cutting during the summer and as distant as every three or four weeks in the winter.

After cutting all the clippings should be removed because they can provide ideal conditions for development of diseases and insect pests. Apart from that, clippings become unsightly in the summer as they do not break down easily and often after rain or heavy watering build up on the edges of slight depressions. Accumulated leaf cuttings can quickly form an organic seal on the surface of the soil excluding air and water.

Fertiliser

Unless lawns are watered quickly after fertilising, fertiliser scorch can occur from any type of fertiliser if it is applied when the surfaces of the leaves are moist. Applications of excess amounts of soluble fertiliser at any time should be avoided. Any water soluble form of phosphorus, nitrogen or potash fertiliser can cause burning. Recommended fertiliser should be applied when the leaf surface is dry and the lawn watered immediately afterwards.

Fertiliser must be applied evenly if unsightly changes in the colour pattern are to be avoided. It is wise to divide the total quantity of fertiliser into two or more parts, and to fertilise the whole lawn with each part following a different pattern of application for each.

Watering

The correct method of watering is most essential. Shallow watering will encourage the roots to grow near the surface and make the lawn more and more dependent on surface moisture. Consequently if the lawn is not watered for a few days during hot weather it will wilt rapidly and become more liable to drought than if it was not watered at all.

Enough water should be applied to the lawn to penetrate about six inches into the soil. Watering can be done at any time during the summer but night watering during the spring and autumn should be avoided to help reduce the incidence of disease.

Other Causes

Shaded areas, especially from buildings, fences and trees are hard to maintain in the winter; this is particularly so with buffalo and couch. Trees will often compete too severely for water and fertiliser in the summer and cause poor growth of the lawn. This may mean more water and fertiliser is needed in these areas.

Where shading occurs in the winter it is hard to keep the grass growing and moss often occurs. This should be controlled as recommended and the areas well fertilised in the early winter to help the grass grow through the period of shading.

Some gardeners use bent and fescus grasses on these areas to maintain the lawn—but greater care and attention is needed in the summer to maintain them.

Other forms of damage would mainly occur from diseases and insects and weeds which are dealt with in Department of Agriculture Bulletins, Nos. 3147 and 3148.

On bowling greens patches occur where bowlers step from the plinth onto the green or often where the mat is laid during bowling. These need quick attention to avoid unsightly patches. Light raking of these areas is recommended.

Oil spots from faulty machinery may cause spotting in lawns or in severe cases lines where oil burn has occurred.
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HOME LAWNS

In Western Australia home lawns consist mainly of buffalo grass but some people use couch and a few kikuyu or other grasses. Because of the long summer drought which occurs, the use of other lawn species such as the bents, fescues, and blue grasses is limited. Apart from the climatic conditions, much more attention is needed to maintain the bents, fescues and blue grasses as they are more exacting in their soil requirements and need specialised fertilising. The control of weeds, insects and fungus pests is essential at all times.

To grow a good home lawn these points in establishment should be carried out:

(1) Soil Preparation—The area should be well cultivated to a depth of 4 in. to 6 in., free of weeds, levelled and compacted with a fine surface tilth.

(2) Fertilisation—Before planting, the whole area should be fertilised at the rate of 3 oz. per square yard with the following mixture—

- 7 parts by weight blood and bone.
- 4 parts by weight superphosphate.
- 1 part by weight muriate of potash.

This mixture should be worked well into the top 3 in. of the soil.

Alternatively, 3 oz. of blood and bone per square yard could be worked into the soil before planting and a surface application at the rate of 1½ to 2 oz. per square yard after planting of a mixture consisting of—

- 3 parts by weight sulphate of ammonia.
- 1 part by weight superphosphate.
- 1 part by weight muriate of potash.

Planting

Unfortunately seed of buffalo, kikuyu and Queensland blue grasses are not available but with most of the other seed can be obtained. Planting of most lawns is done vegetatively by runners or rooted cuttings and some by seed.

Runners of buffalo, couch, kikuyu and Queensland blue may be planted in rows 4 in. to 6 in. apart with 4 in. between sets or in some cases couch and kikuyu can be planted by mechanical means with implements such as sprig planters or rotary hoe.

With the rotary hoe the runners are spread evenly on the surface just before hoeing in to varying depths with a maximum of 4 in. This operation can be carried out during most of the year except June and July.

Couch grass can be planted by seed from September to March for best establishment but not during the rest of the year. Other lawn seeds are best sown from March to November but this can vary according to the type and mixtures being sown.

All grass seeds are small and are usually sown at the rate of ¼ to ½ oz. per square yard. They should be mixed with at least six times their volume of sand or sawdust and then half sown both ways to get a uniform cover. After sowing, the seed should be lightly covered by scuffling the surface with a lawn rake and if possible the area rolled after. Rolling may be difficult on very loose sand unless well watered before hand.

After planting until germination keep the ground moist without over-watering. This can be done by hand watering night and morning with a fine nozzled spray.

About six weeks after sowing a further application of a fertiliser is necessary. About 1 to 1½ oz. of a 3 : 1 : 1 fertiliser is recommended.

Before planting seeds or runners make sure the area has been well worked, fertilised and watered as recommended.

Once the sown area is established it is necessary to carry out efficient watering, fertilising and mowing. This is shown under general maintenance.

Maintenance

With careful treatment the sown area quickly covers the ground and care must be taken with runner type grasses with the first cut. It may be necessary to roll, but when cutting set the mower height to 2 in. to 2½ in. Following this operation another application of fertiliser will pay—again using the 3 : 1 : 1 mix but at ¾ to 1 oz. per square yard. Topdress with clean sand to lightly cover the runners and even out any slight depressions for levelling the area.
From then on watering, cutting and if necessary light rolling should be done at regular intervals for three to four months. Watering should be gradually reduced to twice a week during the summer. The water applications should be fairly heavy to penetrate the soil and encourage deeper rooting.

When fully established lawns need efficient watering during summer and at any other dry period. Regular and efficient cutting is needed during the active growing period and during the early autumn apply about 2 oz. of 3 : 1 : 1 fertiliser to stimulate root and top growth in the winter.

During the winter the periods between cutting should be longer and the cutting height raised until the spring when once again closer cutting can be made.

In the early spring, and only if the lawn is uneven, levelling can be carried out by light sand application. Heavy blanketing of any lawn area with sand is not necessary or desirable and annual applications are definitely not recommended.

Frequently, in the early spring, a light application of 1 to 1½ oz. per square yard of a fertiliser such as 3 : 1 : 1 can be applied. During the summer months, if it is needed, a light application of urea at ¼ oz. or sulphate of ammonia at ½ oz. per square yard will stimulate the lawn and maintain a pleasing colour in the grass.

**TENNIS COURTS**

Couch grass is the only grass in this State which is used successfully as the main base for good tennis courts. Even then, if a good playing surface is to be maintained during the season, the upkeep of this grass is not simple. The surface of the court should be level and the grass vigorous, but without blemish. Grass on a tennis court must be well fertilised, cut, rolled, topdressed and watered for best results.

**Soil**

Most tennis courts in the metropolitan area are established on sand, and if good care and attention is not given to the initial establishment of the area there is likely to be major troubles later.

Before planting, the area should be well worked to a depth of 6 in. and a 2 in. layer of good loam spread over the top. This loam should then be incorporated into the top 4 in. of the sand with a rotary hoe or similar machine. When this has been done the area needs consolidating and watering, and finally it should have a fine loose tilth on the top ½ in. of the surface. Cuttings, roots or seed can be used to establish the couch over the area. Before planting 3 oz. per square yard of the following fertiliser should be spread:

- 7 parts by weight of blood and bone.
- 4 parts by weight superphosphate.
- 1 part by weight muriate of potash.

Careful watering but not over-watering is necessary during establishment. After three months a further application of ½ to 1 oz. per square yard of a 3 : 1 : 1 fertiliser mixture should be given.

After a good cover growth is obtained a light rolling should be carried out. To level the surface and cover the top runners a light topdressing of a mixture of sand and loam, three parts to one, should be given. Six to eight weeks later ½ to 1 oz. per square yard of sulphate of ammonia should be applied, and if required a further application at a similar interval is often beneficial.

The major fertilising should be given in the late summer or early autumn to stimulate growth during the winter months. This helps reduce the incidence of weeds. A good general fertiliser for this time of the year is again the 3 : 1 : 1 applied at 3 oz per square yard.

During the early spring a further 1¼ oz. per square yard of this fertiliser should be applied and if necessary the area lightly topdressed with the 3 : 1 sand-loam mixture. Sulphate of ammonia should be used at the rate of ¾ oz. per square yard once or twice during the summer as required to stimulate the grass.

**General Maintenance**

Tennis courts at times have to stand up to a considerable amount of heavy play and often abuse, more so when the courts are played on while damp or wet. The effects of this play bring about bare patches, especially on the service lines and sometimes at the nets.
To avoid this the court area should be sufficiently wide and long enough to allow movement of the lines so that the same area is not used continuously. Apart from this more care should be taken of the condition of the grass and soil of the courts before heavy and prolonged play takes place.

Where bad patches and bare areas occur these should be treated before they become too large. It is necessary to fork these areas to aerate the ground, fertilise, seed, or lace in good couch roots or runners and lightly topdress the areas with the standard topdressing mixture of sand and loam. It is essential that the same topdressing material be used in all operations at all times.

Every second year a liming of the whole area is advisable and the use of one bag of ground limestone per court is recommended. This should be applied in early July or mid-winter. Control of weeds as recommended should also take place during the recess periods.

Cutting should at all times be regular and the height of cutting altered according to seasons and growth. Close cuttings should only take place during the summer periods when the grass is most vigorous. It is essential to remove all grass clippings and to see that the mower is in first-class condition to avoid bruising of the grass.

Watering must be efficient as over-watering is as harmful as under-watering. During the hot summer two waterings a week should be enough. Providing the watering is efficient, about ¾ in. per acre of water is required for each of the two waterings per week.

Rolling should be carried out with a medium weight roller, before watering but after cutting. Excessively heavy rolling is not needed on tennis courts.

BOWLING GREENS

The bowling green is probably the most used and abused turf and it needs much attention and care to keep it in a perfect condition. Bowlers want a smooth, even, tightly clipped, fast surface at all times, regardless of seasons or climatic conditions.

The establishment of the green is the same as for a tennis court but it is recommended that once established, fertiliser should be applied at four or five-weekly
Most ovals, especially school ovals, get heavy punishment and require good care to keep them in top playing condition. This picture shows one of Perth's public school grounds. It has been well cared for by good management and attention to topdressing, watering and cutting.

OVALS

As a general rule these are used for cricket, hockey, baseball, football, athletics, etc., and have to stand up to heavy wear and tear at certain times of the year.

Football, and hockey in the heavy winter months does the most damage to the grass and football has a detrimental effect on the turf cricket pitches on the oval. However by efficient management, much can be done to avoid the heavy wear and tear on these areas.

The first consideration on an oval is to see that it is well drained. Many curators in this State have the impression that as the oval is on sand it is naturally well drained, but this may not be the case. Years of play together with bad management tends to pack the sand, and during heavy winter rain the area often becomes waterlogged. The efficient use of well-laid agricultural drains is recommended.

One of the major problems on ovals used for winter sport are the clay cricket pitches. During wet weather these often become quagmires which the players dislike. Much can be done by the curators to make these areas firm and not a hazard to players. The turf wickets should be effectively drained and efficiently fertilised in the autumn and winter to get and keep up a good grass cover. After play on wet days the wickets should be given attention by levelling and rolling them out if it is possible.

The grass area on the oval should have careful attention through the whole season so that it is kept in first-class order. To maintain the oval in this condition the following points should help:—

1. Fertilising

A good general fertiliser is recommended. A 3 : 1 : 1 mixture should be applied early in April at the rate of 2½ oz. per square yard. It should be applied uniformly. If necessary an application of sulphate of ammonia can be given in early June at the rate of ¾ oz. per square yard. A further application of the mixed fertiliser can

intervals at the rate of ¼ to 1/4 oz. per square yard. The mixture should contain a fairly high percentage of nitrogen such as the 3 : 1 : 1 mixture.

General Maintenance

Wear ends and bare patches occur on bowling greens and are caused by many factors.

These include excessive play, using greens when the surface is wet, or at nights when heavy dews occur, over-rolling, cutting too short or scalping the grass at the beginning or end of the season, together with incorrect fertilising and the use of unsuitable topdressing materials. Weeds, insect pests and diseases should be kept under control at all times.
be applied at 1½ oz. per square yard in the spring and just before topdressing the oval. If being applied during the summer, two dressings of urea or sulphate of ammonia can be given at rates of ½ or ¾ oz. per square yard at six-weekly intervals.

2. Clover
The association of suckling clover with the couch grass is recommended for a good winter and spring green. Inoculated pelleted suckling clover seed should be sown at the rate of 10 to 12 lb. with at least 2 cwt. of super per acre in the late autumn.

3. Weeds
Weeds will not be a problem on most ovals providing the grass and clover is kept at its maximum production. Where there are weeds however, every endeavour should be made to control them.

4. Topdressing
The ideal playing surface is one which is firm yet resilient but does not cut up with play. To obtain this it is necessary to build up the oval with a topdressing mixture consisting of—

1 part by volume good loam.
3 parts by volume good yellow sand.
4 parts by volume good screened cinders.

This mixture should be applied uniformly in layers not exceeding ½ in. during the interval between the football and cricket seasons. The topdressing can be used for gradually levelling out depressions and can be applied at any time during the summer when it does not interfere with playing fixtures. The maximum layer should not be more than two inches deep.

5. Cutting
It is necessary at all times to have the mowers in good condition and all grass cuttings should be removed and preferably composted. Short, close cutting should be done only in the late spring, summer and early autumn and close cutting should never be carried out in the winter.

6. Watering
The first essential with watering is to have an adequate supply which can be applied uniformly and rapidly. Underground pipes with boxes for taps should be avoided. The best system is the use of the movable surface pipe system. The application of about 30,000 to 36,000 gallons of water per acre per week in the summer should be sufficient. In the hottest periods two waterings per week should be enough.

7. Rolling
Rolling may be necessary at certain times of the year. Heavy compacting will result if it is done after watering but as a general rule rolling is not necessary.

General Maintenance
When the oval has been used excessively for play and is partly torn about, smoothing over with link harrows is necessary to fill in scars and depressions. In some cases it may be essential to use the loam-sand cinder topdressing mixture for filling in areas with bad scars or depressions.
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