TURF FOR SPORTS USE

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DIVISION OF FORAGE PLANTS
DOMINION EXPERIMENTAL FARMS

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
BULLETIN No. 148—NEW SERIES

Published by direction of the Hon. Robert Weir, Minister of Agriculture,
Ottawa, 1931

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TURF FOR SPORTS USE

In 1925 the work of the Division of Forage Plants, Central Experimental Farm, Ottawa, was enlarged to include tests of grasses and methods of producing and maintaining fine turf for sports use. A collection of seed and living plant material was made and a very extensive nursery started of all grasses suitable or thought to be suitable for fine turf production. An area was prepared for experimental greens which were established and have since been maintained except that undesirable plantings have been replaced by other material for test. From the nursery, stolons of creeping bent have been supplied, free of charge, to all clubs or individuals requesting such material for nursery use. Information has been made available on fine turf production and is now submitted in bulletin form for the guidance of those interested in the production of fine turf for sports use.

Preparation of the Seed Bed

The preparation of land for grass production requires a well worked seed bed, firm and compact below and in very fine condition on the surface. For fairways, except in very exceptional cases, ploughing, disking, harrowing and rolling are necessary, and barnyard manure at a rate of 20 to 30 tons per acre should be applied and ploughed under. Disking and harrowing must be sufficient to break up all lumps and leave the seeding surface in very finely pulverized condition. Where a change of grade is necessary such as in building a green the top soil to a depth of 3 or 4 inches should be removed, the desired grade established, the ground well worked and compacted to a depth of 3 or 4 inches, and the top soil replaced after it has been well pulverized and screened. Where vegetative material is to be planted sufficient of the screened top soil can be retained at the green to supply the necessary covering for the stolons.

Drainage

No grass can be expected to produce satisfactory results on water-logged soil and where drainage is necessary it must be provided. For raised greens, particularly where the soil is sandy and where seepage is not present from higher ground, artificial subsoil or underdrains may not be necessary, but when such drainage is necessary tile drains are the most satisfactory to use. Lack of surface drainage is one of the main reasons for much of the winter loss of grass in Canada and all greens must be laid out and built to provide a free outlet for surface water from the green as a whole and from all parts of it. No matter how satisfactory subsoil drainage is there are times when it cannot function and at such times water on the surface of the green can be expected to cause damage to the grass.

Method of Seeding

Seeding should be done broadcast and all possible precautions taken to prevent the seed being left in rows or waves. A division of the seed to be sown into two parts and two separate seedings, the second to cross the first at right angles, made over the area to be sown will give evener stands, than where only one seeding is made. Broadcasting by hand can be done by careful and experienced men but machine seeding is preferable.

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Time of Planting or Seeding

Creeping bent stolons produce the best results for green production where they are not more than one year old. Nurseries can be started at any time during the spring, summer or fall, but as heat and moisture give the most ideal conditions for growth, June, July or August are the best months for producing greens from seed or stolons. Where natural precipitation must be depended on as in fairway seeding spring or fall seeding is advisable.

Covering Seed

For large areas such as fairways, seed can be covered by one or two light strokes of the harrow. For greens, light hand raking can be done to work the seed below the surface, care being taken that in raking the seed is not drawn into rows or waves. Seed can also be covered on greens by adding top soil or compost when the seeding is completed. Such a covering should not be more than one quarter inch in depth.

Rolling

Rolling in the preparation of the seed-bed compacts the soil and assists in bringing the surface soil to the desired finely pulverized condition. In moderation rolling can be done on established sod to keep the surface true but heavy rolling, particularly when the ground is water soaked, should not be practised. Light rolling and frequent top dressing are the recommended method for keeping the playing surface of greens true.

Watering

In Canada good grass greens can not be produced and maintained unless adequate water is available, which must be provided by a water system, which will reach all greens. It is impossible to definitely state when or how much water should be used on a green nor is any information available as to what time of day is best for applying it. Watering will of course be done when it does not interfere with play but apart from this limitation watering of greens or fairways can be done at any time of the day without damage to the greens. The amount of water is governed by what is required to keep the grass in a healthy vigorous condition. On newly sown or vegetatively planted greens soil must be kept moist until growth is well established.

Weeds

There is no known inexpensive easy method of eradicating weeds from turf. Dandelions can be destroyed in greens by applying strong sulphuric acid to the crown of the plants, care being taken that acid does not get on the surrounding grass or on the person applying it. Where weeds are present they must be removed and every care should be taken that weed seeds be not sown with grass seed or top dressings. Where the grass cover is thick and kept in vigorous growing condition weeds have not the same chance to develop as when the grass is thin and in poor condition. Compost and manure, even when well rotted, does contain viable weed seeds and steaming of compost used for top dressing greens is recommended, particularly where grass clippings have been used in the compost.

Top Dressings

BARNYARD MANURE

Barnyard manure supplies plant food and humus which is very important in maintaining grass in vigorous growing condition. Its application to greens or fairways is not looked on with favour during the playing season and it can be well restricted to late fall use and forming a very important part of the compost pile. When used it should only be applied in well rotted condition, which condition is reached usually in about 2 years by which time many of the weed seeds will have been destroyed and the material breaks up readily when forked over. As a fall dressing for fairways, particularly on light soil, well rotted barnyard manure applied at a rate of from 10 to 25 tons per acre will prove beneficial.

SAND AND BLACK MUCK

Top dressing with pure sand or black muck is not recommended but when used should be applied as part of the regular compost top dressing. Neither have any particular fertilizing value but are used chiefly to correct and improve the mechanical condition of the soil.

COMPOST

Compost is an absolute necessity for use on greens for three main reasons, to keep the surface of the green true, to add plant food and to correct and improve the general condition of the soil for the benefit of the grass cover. While much waste material such as grass clippings, leaves, etc., can be composted, the best compost is made from soil or sods, barnyard manure and sand. The compost used on experimental greens at Ottawa is made from sandy loam or sods from such soil, manure and sand. A foot of soil or sods is covered with a three-foot layer of fresh manure and about one inch of sand. This layering is repeated until the pile is about seven feet high, and the whole is then left to stand for at least one year. Where additional sand is required it is added to the compost before use.

QUANTITY OF TOP DRESSING

Repeated light top dressings at frequent intervals give better results than where heavier applications are made at long intervals. At no time should a depth of more than one quarter inch be used as a top dressing and this rate only late in the fall. For regular top dressings during the playing season only that amount should be applied which can be worked down into the grass. This means an application $\frac{1}{16}$ to $\frac{1}{8}$ inch in depth and this application is recommended at least once a month during the playing season. For an area of 5,000 square feet it requires 0·9 cubic yards to cover to a depth of $\frac{1}{16}$ inch, $\frac{1}{4}$ inch deep requires 3·8 cubic yards and $\frac{1}{2}$ inch deep requires 7·7 cubic yards.

Grasses

Not all grasses are adapted for turf production even though they be highly recommended for the production of hay and material such as timothy, orchard grass, meadow fescue, etc., should never be sown alone or in mixtures with the expectation of producing fine turf. It is impossible to produce good turf under all natural conditions in Canada, so that it is necessary, particularly in the case of greens, to suit soil and moisture conditions to the best species of grass and not attempt to suit the grass to the natural conditions. In exceptional circumstances some grasses may have to be used which otherwise would not be recommended but no general recommendation could be given to cover such cases.

Kentucky Blue

Kentucky Blue Grass grows naturally under a great range of soil and climatic conditions, is resistant to drought, but reaches its best development in friable moist soils, rich in humus. For fairways and ordinary lawns it is the most generally suitable grass for use in Canada. It will not however, stand close cutting and for greens is not recommended. It is rather slow in becoming established and for this reason red top can be added to it to provide a temporary sod while the blue grass is becoming established. The seeding rate is 100 to 150 pounds per acre when sown alone. When sown with red top one part red top to four parts Kentucky blue is recommended. On approaches to greens half of the red top can be replaced with an equal weight of south German mixed bent, velvet bent or Rhode Island bent to improve the quality and denseness of the turf.

Canada Blue

Canada Blue Grass will grow on poorer soils and in drier locations than will Kentucky Blue, but where soil conditions are such that only Canada Blue will grow it is better to improve the conditions so that other grasses can be used than to depend on Canada Blue to produce satisfactory sod for fairways or general lawns. Its use on golf courses should be confined to the rough where it can be sown either alone or in mixture with sheep fescue. If sown alone on the rough 60 to 70 pounds per acre is recommended and when sown with sheep fescue the same rate can be sown of the mixture using 50 per cent by weight of each.

Red Top

Red Top is a valuable grass alone or in mixtures, but only for providing a temporary surface while other grasses are becoming established or for the production of temporary greens. It starts growth quickly from seed and in its early stages produces a very fine quality turf which after the first year becomes coarse and open in texture, giving a very unsatisfactory playing surface. Sown alone for temporary greens 3 to 4 pounds seed per 1,000 sq. ft. is the recommended seeding. Where some of the finer grasses are being sown such as velvet bent or south German mixed bent and it is desired to cut down the initial cost of seed, red top can be used in the proportion of one part red top to four parts of the grass which is to provide the permanent playing surface.

Red Fescue

Chewing's Fescue (red fescue) is not recommended for greens or fairways. On greens it will not stand continued close cutting and under fairway conditions it becomes established slowly and as it grows in tufts or bunches produces a very unsatisfactory turf.

Sheep Fescue

This grass should not be used for greens or fairways but can be used to advantage in mixtures for seeding the rough.

Velvet Bent

Velvet bent produced at Ottawa the best of the seeded greens. Seed raising of velvet bent has been encouraged in Prince Edward Island under the general direction of the Dominion Seed Branch and seed is available from that source protected by official seed grade certificates. Such seed, certified as to genuineness is capable of producing exceptionally good greens. Seeding rate 3 pounds per 1,000 sq. ft.

Rhode Island Bent

Rhode Island Bent (Brown Top) does not produce as good greens as velvet bent but where water is limited Rhode Island bent is better adapted for use than any of the other bents available. Seeding rate 3 pounds per 1,000 sq. ft.

South German Mixed Bent

Seed of true creeping bent does not exist commercially in pure form. The bent listed in Canadian seed catalogues as creeping bent, south German mixed bent and similar trade names is a mixture of bents. This mixture generally consists of velvet bent, Rhode Island bent, some true creeping bent and other agrostis species often including red top in varying quantities. The value of the mixture will of course depend on the percentages present of those fine turf grasses considered as the best for seeding greens. Of several lots tested at Ottawa all produced excellent turf which compared favourably with that produced from the velvet bent seeding.

Mixtures

Mixtures, with the exception that they may be used to lower costs or to thicken up a seeding whilst other grasses are becoming established, are not recommended for greens or fairways. The object in seeding a green is to provide a permanent uniform playing surface and as different grasses have different growth habits and textures, mixtures cannot be expected to prove satisfactory.

Creeping Bent

Creeping bent exists in many different strains, can be found growing wild in many sections of Canada and is also found in patches on many established greens where it has been introduced in seed of other grasses. All creeping bent does not produce equally good turf so that if it is decided to use creeping bent a strain should be obtained which has, based on actual tests, proven satisfactory. The Washington and Metropolitan strains, received through the courtesy of the United States Golf Association are undoubtedly the best strains of creeping bent now available and sufficient of these strains can be obtained free of charge for nursery planting. In the test plots at Ottawa the Washington and Metropolitan bents produced the best sod of any creeping bents tested and superior turf to that produced from seeding of any other kind of grass. Seed of Washington or Metropolitan creeping bent is not available commercially so that greens put down to either of these strains must be started from vegetative cuttings. Material for vegetative plantings can be purchased commercially but the cheapest, most satisfactory and most logical source of supply is from nurseries established and maintained by the club desiring to produce creeping bent grass greens.

The Grass Nursery

There are two types of grass nurseries which can be used to advantage for the production of material for vegetative planting or sodding of greens; the row nursery limited to species of grass that produce stolons, and the sod nursery where any grass desired for the surfacing of greens can be produced as a sod for resodding purposes.

Where creeping bent is to be used both a row and sod nursery should be maintained, the former for producing vegetative material for maintaining the latter and the latter for patching or resodding greens. The use of sod saves

at least 6 weeks in the time out of play when a new green is being made or an old one resurfaced and makes available material for patching greens without taking them out of play for more than the time necesssary to set in new sod.

Row Nursery

Land should be in reasonably good condition, free of all weeds or other grasses, and so planted that it can be conveniently worked and watered when necessary. When ready it should be marked off for rows 3 feet apart and the stolons, whether chopped up or not, laid in shallow trenches from one to three inches deep. Where material is limited more row length can be put in by chopping the stolons into short lengths, spreading along the bottom of a trench about one inch deep, then covering and watering until growth is established. Uncut stolons can be placed in a thin row along the bottom of a trench three inches deep and covered so that parts of the stolons remain above ground. With this method, unless the ground is very dry watering is not necessary and this method is recommended particularly for fall use. If it is desired to force growth fertilizer can be applied to the rows when the new growth has started. Weeds and other grass must be kept out of the nursery at all times.

Sod Nursery

As the surface of the sod nursery is to become the permanent surface of greens, the sod nursery particularly the top inch and a half should be good soil, well worked and free of stones. Freedom from weeds is just as essential in the sod nursery as it is in greens. Drainage both surface and subsurface, if necessary, must be provided and ample and convenient watering facilities are necessary. Seeding or vegetative planting is done in the sod nursery the same as for greens and subsequent maintenance must be such that the sod can quickly be brought into a desirable playing surface. Fertilizing, top dressing and watering must be done, although not to the same extent as is necessary for a green in use. Mowing is necessary but need not be as close nor as often as for regular greens. At least two weeks before use maintenance should start the same as for regular greens and the sod brought into playing condition.

Sodding

When a sod nursery is available and it is desired to surface a new green or resurface an old one the sod is cut into uniform sections of convenient size, lifted and immediately transferred and laid in the new location. One and one half inches is a sufficient thickness for sods and this depth should be uniform for all material used. Drying out of sod between lifting and laying should be prevented and nothing should be allowed to delay transplanting once the sod is cut free from the nursery. Laid carefully, rolled, top dressed and watered a newly sodded creeping bent green should be ready for playing on at most two weeks. Greens have been in play one week after sodding and where sod is used for patching the patches can be made and the green in play the same day.

Vegetative Planting of Creeping Bent Greens

When creeping bent stolons are to be used everything should be available at the green and nursery so that once started the work can be completed quickly and without interruption. At the green sufficient good screened top soil or compost must be available to cover the stolons, a cutter is necessary either at the nursery or green to chop the stolons and men available to lift, cut, lay and cover the living plant material in one continuous and rapid opera-

tion. Stolons after removal from the nursery rows must never be allowed to dry out and while it is true that vegetative material will stand considerable transportation and delay between lifting and laying the shorter that delay the better will be the stands produced.

Vegetative material (stolons) are obtained from the nursery rows by cutting the plants off at ground level with a hoe or hoeing the row out to a depth of about one and one half inch. Where soil is light so that earth can be readily knocked off the roots it is recommended that the row be hoed out. Where soil is heavy and such that it will not shake off readily the row should be cut off with a hoe at ground level. When up and free of earth the material should be quickly cut into short lengths ready for laying. There are several suitable feed cutters on the market which will chop the stolons satisfactorily. At Ottawa two runs through a No. 2 Cummings cutter has given very good results. As soon as sufficient cut stolons are ready to plant, planting should start in strips about four feet in width across the green. The cut stolons are laid as a mat on the prepared surface and as soon as a strip is laid it should be covered with one quarter inch of top soil or compost. When covered a light roller should be used to pack the soil closely around the cut stolons and then another quarter inch of covering put on. When covered water must be applied sufficient to moisten the soil and planted material. The planting of these four-foot strips should continue until the green is completed.

Water is one essential that must be provided and it is necessary to keep the soil moist until new growth is well started even though this may necessitate two, three or more waterings a day. Under no circumstances must newly planted greens be allowed to become dried out. Providing soil used for covering is good top soil or compost, fertilizer need not be applied until growth shows above ground. When up growth should not be allowed to get longer than one inch above ground and as soon as this length is reached cutting should start with a mower or if necessary with a scythe. Once well established light top dressing should be put on to accurately level up the surface and with these top dressings fertilizer can be applied. As soon as the surface is firm enough to stand the regular use of a lawn mower, regular mowing, watering, top dressing and fertilizing should be given the same as should be given for a green in play.

One square foot of nursery row will plant 5 to 10 sq. ft. of green. Fairly heavy planting has given us the best and quickest result and we recommend using stolons at the rate of 1 sq. ft. nursery row to 5 sq. ft. of green. Where sod nursery is being established and their early use is not required thinner plantings of the stolons can be made.

Resurfacing of Established Greens With Creeping Bent

Where the playing surface on an established green is unsatisfactory vegetative planting of creeping bent can be made without removing the old sod. For such a resurfacing the planting is done the same as for a new green except that the stolons are laid in a mat on the old sod which must previously have been cut very close or scalped. Where the old surface is generally weedy it is advisable to remove the old sod or if weeds only occur in patches such sections should be removed and the surface brought up to the level of the rest of the green with soil well packed in. A heavy watering of the green is advisable before laying the stolons, which are laid, covered and treated the same as for a new green.

Creeping bent can be introduced into established greens by using plugs of creeping bent sod wherever the cup is moved, by doing any necessary patching with bent sod and by introducing stolons into the green in rows. In this method the green is lined out for rows six inches to a foot apart, the sod

opened with a spade and the stolons laid in a row along these openings. A rolling and top dressing will then close up the cuts in the green which can be continued in play. Bent put in in this way will of course show up in rows, but these rows will spread and gradually disappear as the creeping bent spreads and crowds out the other grasses.

Fertilizers

Like all other living things grass requires food and the necessary plant food must be supplied if the grass is to remain in vigorous healthy condition. Plant food which must be supplied consists of nitrogen, phosphoric acid and potash available in many different forms of fertilizers both organic and inorganic. The organic fertilizers include bone meal, cottonseed meal, dried blood, tankage, etc., while the inorganic fertilizers include the mineral fertilizers such as nitrate of soda, ammonium sulphate, superphosphate and muriate of potash. Commercial fertilizers sold in Canada contain these plant foods in varying proportions and are advertised as 4-8-4, 2-8-4 or under some similar designation. All fertilizers must show guaranteed analysis and the 4-8-4 indicates that that particular brand or mixture contains 4 per cent nitrogen 8 per cent available phosphoric acid and 4 per cent potash. Similarly a 2-8-4 fertilizer contains 2 per cent nitrogen, 8 per cent available phosphoric acid and 4 per cent potash. Depending on the source of the nitrogen in a fertilizer it is said to be quickly available or not. Nitrogen in ammonium sulphate or nitrate of soda is quickly available and produces very quick results while the nitrogen in cottonseed meal for instance is not so readily available, therefore the results from this fertilizer are slower but spread over a longer period.

Nitrate of Soda and Ammonium Sulphate

Quickly available nitrogen is necessary for maintaining greens in good condition and because the effects are quickly apparent, but not lasting, this nitrogen must be supplied in frequent small applications rather than heavy applications at longer intervals. Ammonium sulphate has the advantage over nitrate of soda in that it is cheaper and its residual effect on the soil is acid, which discourages the growth of clover. Monthly applications of 2 pounds per 1,000 square feet are recommended during the growing period for greens. Care is necessary in applying nitrate of soda or ammonium sulphate either alone or in complete fertilizer mixtures to prevent burning of the turf, and, on greens particularly, they should not be applied except by men used to handling them. They may be applied mixed with compost or in a solution with water, but however applied must be immediately well watered in to prevent damage.

Superphosphate

Superphosphate has a beneficial effect on grass but its use stimulates the growth of clover and it is not recommended for general use on greens. In complete fertilizers for fairway use it can be used to advantage where top dressing with manure is not possible.

Muriate and Sulphate of Potash

These two are the potash bearing fertilizers most commonly in use but are not normally applied except as part of complete fertilizers for greens or fairways.

Snow Mould

The most serious disease affecting greens in Canada is snow mould, a grey mouldy growth which may cover the grass when the snow goes off leaving a grey slimy mass of dead or badly injured grass. For the prevention of snow mould an application of corrosive sublimate at a rate of 2 to 3 ounces per 1,000 sq. ft. has proven satisfactory.

Worms

Corrosive sublimate or lead arsenate are recognized as satisfactory for controlling earthworms in greens. The corrosive sublimate at a rate of 1 ounce per 100 sq. ft. can be applied mixed with compost or applied in solution to the greens. Its effect is very rapid but with us has not been lasting. It should be applied whenever worms are troublesome. Lead arsenate applied and watered in at 5 pounds per 1,000 sq. ft. has given more lasting results than corrosive sublimate. Applied with compost, well worked into the grass and then watered in this material after several applications at monthly intervals poisoned the ground so that worms could not live in it.

Ants

No satisfactory method is known for keeping greens free of ants. They can be controlled to a good extent with carbon bisulphide. This is a liquid which when not confined turns into a heavy gas and a small quantity placed in each ant hill will break up that colony. A wet sack about a foot square placed over the hill after it has been treated will hold the gas in the soil and intensify the effect of the treatment.

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