

PHOTOGRAPH SHOWING DIFFERENCE IN CHARACTER OF TURF FORMED BY DIFFERENT GRASSES.

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THE SEEDING AND PRESERVATION OF GOLF LINKS

BY

J. M. THORBURN & CO.



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Introduction



THE preparation of the following pages was suggested by the frequent applications received from golf clubs for information as to the seeding of their grounds. Their aim is to answer the questions that present themselves to greens committees in connection with the formation of new courses, and the maintenance of established ones. These questions are assuming greater importance every year, the constantly improving condition of the older and more favorably situated links raising the standard of what a course ought to be, and the practice of intervisiting keeping that standard constantly in view. Every club is anxious to have for visiting players, especially during the open tournaments, as fine a course as they are accustomed to, and every chairman of greens committee feels the spur of criticisms made by members of his own club on their return from visiting a better course. So that the ideal links will always be, for most clubs, only an aspiration; and it is easier to point out the inevitableness of this state of things than to

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provide a remedy for it. The only approach to a remedy, indeed, in our varied and trying climate, is constant care and attention, intelligently directed.

These incentives to the improvement of the grounds, however, are assuring the future of golf in America, and the gentlemen who assume the burdens of the work are doing more for the cause of the game than they are generally credited with. For to the majority of its votaries the charm of golf will always include the freshness of the country air, and the exhilaration of walking on a green elastic turf, untiring to the foot and pleasing to the eye.

Turf-forming Grasses

THE first condition of success in securing a good golf course is a due recognition of the relation between soil, situation and climate on the one hand, and the different varieties of grasses on the other. As every grass has its own peculiar habit and habitat, the whole inquiry resolves itself into two questions: First, what varieties are suitable for golf links; and, second, which of these are, at the same time, adapted to the peculiar soil and situation under consideration?

The first question is easily disposed of, as it is obvious that all *turf-forming* varieties are suitable, without regard to their particular shade of color or fineness of texture. These niceties will be considered separately in connection with the putting-greens. "Bunch grasses," that is, grasses that grow, like Orchard Grass, in tussocks or detached bunches, are excluded, and only those of a prostrate habit of growth, or with creeping, interlacing roots, are admissible. The following list includes all the distinctive and longest lasting of these, and the answer to the second question is supplied by our account of the conditions under which they thrive.

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AGROSTIS CANINA (RHODE ISLAND BENT GRASS). Resembles Red Top (*A. vulgaris*, described below), but is of dwarfer habit, with shorter and narrower leaves. It makes a beautiful, close, fine turf, and is one of the very best grasses for lawns. It adapts itself to almost any soil, rich and moist, or dry, sandy and sterile. It is a native of Europe, but has been cultivated in our Eastern States for many years, being valuable for permanent pastures. Of late years we have been unable to obtain true and pure seed of it here, the meadows from which it is saved having run largely into the freer seeding Red Top. We now import it from Europe, where it has been more carefully cultivated. Four bushels of seed to the acre is recommended for lawns. (12 pounds to the bushel.)

AGROSTIS STOLONIFERA (CREEPING BENT, OR FIORIN). The distinctive feature of this species is, as the name implies, its compact, creeping, rooting stems. It prefers low bottom lands, especially if they are somewhat sandy. It is of rapid growth and spreading habit, and the stoloniferous roots form a strong, enduring turf, that is positively improved by constant trampling. Being of fine texture, it is one of the most valuable of our lawn grasses. If sown alone, 3 bushels to the acre should be used. (The seed weighs 15 pounds to the bushel.)

AGROSTIS VULGARIS (RED TOP; HERD'S GRASS). A very hardy native perennial grass, succeeding best on moist land. It accommodates itself to a variety of soils, however, even to quite dry situations, and stands our hot climate admirably. It is, perhaps, the most permanent grass we have, and it enters largely into the composition of our best natural pastures. It remains green for the greater part of the year, and its long, trailing stems form a very close, matting turf, that is not affected by trampling. It grows well as far south as Tennessee. The seed, as usually sold, weighs 14 pounds to a bushel. The bulk of this is, of course, chaff, and 4 bushels of it would be required to sow an acre. It is safer to buy absolutely clean or "fancy" seed, of which 30 pounds to the acre is sufficient.

ALOPECURUS PRATENSIS (MEADOW FOXTAIL). One of the best permanent pasture-grasses for rich, moist lands. Its

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chief characteristics for our purpose are its extreme earliness and its faculty of standing high summer heats without burning. Although it prefers moist, low grounds, yet it accepts drier situations, and makes an earlier spring verdure than any other variety. It should be sown only in connection with other grasses, 3 or 4 pounds to the acre.

CALAMAGROSTIS ARENARIA (BEACH GRASS). For some sea-shore links this grass may be found useful. Its strong creeping, matting roots bind the drifting sand into natural embankments against the action of wind and waves. We know several golf courses on the east coast of Scotland that owe their existence to its action in binding into *terra firma* the sandy wastes left by the gradual receding of the ocean. In fact, it is to sand tracts so reclaimed that the word "links" strictly belongs. This grass is usually propagated by transplanting in the fall. Where it is necessary to use seed, it should be sown in the spring, and the ground covered with brush to hold the seed in place until it has taken firm hold.

CYNODON DACTYLON (BERMUDA GRASS). Decidedly the most valuable grass for southern golf links. It is of dwarf habit, with long creeping stems, rooting at the joints and covering the ground with a matting of fine turf, which no amount of trampling will impair. As it cannot endure frost, it is of no value north of Virginia. It thrives in the poorest and sandiest soil, and resists extreme drought and the most intense tropical heat. It should be sown at the rate of 15 pounds to the acre.

CYNOSURUS CRISTATUS (CRESTED DOG'S-TAIL). A stoloniferous perennial forming a smooth, compact and lasting turf. It thrives best on rich, moist land, but it can accommodate itself to almost any soil. Its roots penetrate deeply into the ground, which enables it to stand severe droughts. It is, on this account, valuable for hilly situations. The texture of its turf is well adapted for putting-greens. If sown alone, 30 pounds to the acre is none too much, but it is recommended only in mixture with other sorts.

FESTUCA DURIUSCULA (HARD FESCUE). This is really a "bunch grass" and not a creeping-rooted species, but it may

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be recommended in mixture for high, dry, sandy soils, where most other grasses would not grow. It thrives in such soils, and can endure long periods of drought and extreme summer heat. Thirty pounds to the acre.

FESTUCA RUBRA (RED FESCUE). A creeping-rooted species, forming a close and lasting turf, and specially adapted for dry, sandy soils. It resists extreme drought, and thrives on very inferior soils, gravelly banks and exposed hillsides. It is also valuable for binding shifting sands on the sea-shore. As a lawn grass, its chief merit is for positions too shaded for better sorts. Twenty-five pounds to the acre.

FESTUCA TENUIFOLIA (SLENDER FESCUE). This is really a variety of *Festuca ovina*, and not a turf-forming species. It will grow on very dry and inferior soil, however, and its dwarf habit of growth and fineness of leaf render it not unsuitable for such situations in fair-greens. But although it is one of the finest-leaved grasses we have, it will *not* answer for putting-greens. Thirty pounds to the acre.

LOLIUM PERENNE (PERENNIAL RYE GRASS). Although called a perennial, it seldom lasts more than three or four years. It is the most valuable grass of Great Britain, both for pastures and for meadows, occupying there the same relative position of importance that Timothy holds here. The cool, moist climate of England seems to suit it best, yet it succeeds very well in our Middle and Eastern states, and adapts itself to a great diversity of soils. The seed is large and heavy, and produces a strong, verdant growth in four or five weeks after sowing. There are several varieties of the Perennial Rye Grass. That known as "Pacey's" is of very vigorous growth, and of a more bushy and leafy habit than the type. It is excellent in mixtures for strengthening and enlivening the turf of fair-greens. Sixty pounds to the acre.

LOLIUM ITALICUM (ITALIAN RYE GRASS). Though lasting two or three years under very favorable circumstances, it is practically an annual. Like the Perennial Rye Grass, it is a remarkably rapid grower, and has, in addition, the advantage of standing extremes of temperature, remaining green throughout

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the winter, and retaining its freshness in the hottest summer months and during prolonged droughts. When sown very thickly, or in mixture with other sorts, it makes a good, dense turf, and it has been used with much satisfaction on lawns as far south as Jacksonville. On rich, moist soils it is exceedingly productive, and it also does fairly well in less favored situations. Fifty pounds to the acre.

POA COMPRESSA (CANADA BLUE GRASS). A very hardy perennial grass, with creeping root-stocks, forming a close and durable turf of fine texture. It grows on the poorest and driest soils, sandy, gravelly or clayey, standing extremes of wetness or drought, and keeping green till the severe frosts of winter. It is distinguished from the Kentucky Blue Grass by its flattened, wiry stems and by its decidedly bluer color.

POA NEMORALIS (WOOD MEADOW GRASS). The chief characteristic of this grass is its special fitness for shaded positions in lawns and woodland parks, where other grasses will not grow. It is very permanent and hardy, resisting extremes of heat and cold, and is one of the first grasses to show a rich green growth in the spring. The creeping roots are formed underground, and make a good turf.

POA PRATENSIS (KENTUCKY BLUE GRASS; JUNE GRASS). One of our most widely distributed and valuable native grasses. It combines more points of excellence than any other sort. It is a true perennial, lasting indefinitely and improving every year. Its densely creeping root-stocks, spreading habit, and smooth, even growth, fine texture and rich green color render it one of the very best grasses for golf links. It forms a close turf, starts very early in the spring, and lasts till frost. It succeeds in almost any soil, dry, rocky, sandy or gravelly, and stands long-continued dry weather and hot suns. It takes, however, two or three years to become well established and should, therefore, be sown only in connection with other grasses. If the soil is specially suitable it will eventually crowd these out, and make the finest possible sward.

POA TRIVIALIS (ROUGH-STALKED MEADOW GRASS). A spreading, thickly matting, stoloniferous-rooted species, forming

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a fine turf, and well adapted for the more shaded portions of lawns. It thrives on rich, moist soil, and in sheltered situations, but does not do well on dry land. Twenty pounds to the acre.

WHITE CLOVER (*Trifolium repens*). Some White Clover is usually included in lawn grass mixtures. It is of dwarf habit, the stems creeping and rooting at the joints. It spreads rapidly, and is very hardy, resisting extremes of heat and cold, dryness and humidity, and accommodating itself to all kinds of soils. The seed should be sown in the spring—not more than two pounds to the acre.

THE THEORY OF GRASS SEED MIXTURES

The above list comprises all grasses suitable for golf courses, and of which seed can be obtained at moderate cost. Their different characteristics at once suggest the propriety of selecting particular sorts to meet particular conditions of soil, situation and climate. It does not follow, however, that the best results are always obtained by sowing any one variety. For it is a well-ascertained fact, fully recognized by all successful agriculturists, that a thicker and more prolonged growth is produced by a mixture of many sorts than by only one or two, and that a combination of grasses may thrive on a piece of ground on which any one

of them would succeed indifferently. Our present concern is not with the explanation of this fact, but with its significance. It is obvious that a mixture of several sorts simplifies the task of selecting the grass to sow, and minimizes the risk of failure. For out of many varieties there will always be some to succeed, even if others should fail. This is a very important consideration in a climate like ours, where, on certain soils, prolonged droughts and hot weather might completely burn up a turf composed of one species. In a mixed turf the various sorts are mutually helpful in such a case, the very decay of some of them serving as a mulch and protection to the others. But apart from these contingencies, mixtures have a peculiar fitness for golf grounds, in that they insure an abundance of verdure for the greater part of the year, some being at their best very early in the spring and others not till late in the fall.

It is true that there are individual species, like Kentucky Blue Grass, that start very early in the spring and maintain a vigorous growth till winter sets in. They do this, however, only after they have become well established in soils that are eminently suited to them. And when the conditions are specially suited to a particular species all others will be crowded out in a

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few years, anyway. Here, as elsewhere, the struggle for existence results in the survival of the fittest.

For practical purposes, then, it is sufficient to consider the general character of the ground to be seeded, whether high and dry, low and wet, or a good soil between the two. A mixture of five or six of the above-described grasses, preferring corresponding conditions, is sure to give satisfactory results.

Formation of Putting-greens

THE preceding chapter is intended to apply to the seeding of the fair-greens or grounds in general, where the grasses must, from the nature of the case, be chosen to suit the ground. But for the putting-greens the ground may be made to suit the grasses. Their limited area makes this possible, and the fact that only a few grasses will give the required quality of sod and fineness of texture makes it necessary. Eighteen greens, each 100 feet square, cover only four acres of ground,— a space which can easily be given sufficient care and attention to produce a perfect and permanent turf. The unsatisfactory condition of many of our putting-greens is due neither to the climate nor to neglect, but to the initial mistake of sowing unsuitable grasses on imperfectly prepared soil. In their eagerness to begin play, new clubs often plan their putting-greens on the best parts of the existing turf. It may safely be asserted that no amount of care or patching will ever convert these spaces into good greens. Another common method is sodding with transplanted turf. This may be done with success, when good turf of pure Kentucky Blue Grass or

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of the bent grasses can be obtained. Turf of this description is not uncommon in the old pastures of our middle and eastern states. We say old, because the grasses mentioned are those that would naturally be in possession after a number of years, all others being crowded out by them. Where the matter of expense is unimportant and such turf available, some time may be saved and fairly good results secured by sodding. Those who adopt this plan must observe carefully the following necessary conditions of success: The soil must be deeply dug and a liberal supply of barnyard manure or other fertilizer worked into it. The surface should be soft and finely pulverized, and the sod pressed down as firmly as possible upon it. The heaviest roller will not press it too firmly. A covering of half an inch of fine soil, through which the grass will quickly grow, will prevent the turf from drying out.

As a rule, putting-greens formed either by patching the existing turf or by sodding with transplanted turf, are only make-shifts, although under the conditions above mentioned the latter plan has been known to give good satisfaction. The simplest and surest plan is to make the greens by seeding with grasses peculiarly adapted for the purpose.

The first and most important step is to pre-

pare the ground thoroughly. Trenching to the depth of two feet will insure proper drainage, and enable the grasses to penetrate deeply into the soil. The deeper and freer the root-growth the more able will they be to withstand summer droughts and severe winters. If the work can be begun in the fall, so much the better. In trenching, the soil should be thoroughly pulverized, and an abundant quantity of well-rotted stable manure worked into it. The following spring a dressing of ground-bone and chemical fertilizer should be applied, the soil again turned over, the surface finely pulverized by raking and rolling, and levelled to a perfect grade.

Referring now to the list of turf-forming grasses given in a former chapter, we observe that the first two species of *Agrostis*; viz., Rhode Island Bent Grass and Creeping Bent Grass, are suitable for forming the quality of turf required on a putting-green. Their low, creeping, densely matting habit, fine, yet not too fine, foliage, their great permanence, and their peculiar quality of improving the more they are tramped upon, all suggest special fitness for this purpose. A mixture of both sorts should be sown, the greater proportion being Creeping Bent on low, moist soils, and Rhode Island Bent on high, dry land. (In the states south of Virginia Bermuda Grass should be

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used.) These grasses, sown during the latter part of March, on soil so prepared, will produce a turf fit for play by September, and one which will keep on improving indefinitely. If the seed is sown on the newly raked surface, it need not be covered. The ground must be rolled, however, to press the seed into the earth and to give the final smoothing to the surface. In sowing, care must be taken to distribute the seed evenly, and not in patches. A very liberal quantity is recommended of the bent grasses,—say 20 pounds of clean seed to each green of 100 feet square. If Bermuda Grass is being used, 5 pounds will be sufficient for the same space.

Time of Sowing

THE proper time to sow grass seed depends, of course, upon the latitude. In the central and eastern states from the middle of March to the middle of April is the best time, just as the last frost is leaving the ground. If sown later, the grasses may not be strong enough to stand the hot, dry summer months. Seed may also be sown in the fall, provided it is done early enough to secure a good, strong growth before winter sets in. If the young plants are not well-rooted, they are liable to be killed by frost or thrown out of the ground by the action of alternate freezings and thaws. That is the objection to fall sowing. The advantage of it is that, if the grass comes safely through the winter, it has a good start in the spring. The sowing should be done when the ground is moist, or before an expected rain, and a subsequent rolling is always advisable, in order to press the seed into the soil. Seed for the putting-greens should be kept always on hand, and before every rain in summer it should be sown on any thin or burnt-out spots that may appear.

Weeds

DEAN HERBERT said that "plants do not grow where they like best, but where other plants will let them." The remark is peculiarly applicable to weeds—of all kinds. They are most in evidence the first season, before the grass has become well established, occupying every thin or bare spot. But once a close turf has been formed, they will cause little trouble. The only way to get rid of them is to sow enough grass seed to crowd them out and prevent the introduction of others. With a few exceptions they are all annuals, dying at the approach of winter. Let the spots occupied by them be scarified in the spring with a steel rake, or harrowed, if the area is large; then apply some chemical fertilizer and sow grass seed. The weeds will not appear in these spots again. The perennials, however, such as dandelions, docks and plantains, are not so easily disposed of. These must be pulled out by the root and grass seed sown in their places. Most weeds are easily kept down by the lawnmower, and, except by their unsightliness, cause little trouble to golfers. One important exception deserves particular notice. Its scientific name is

Panicum sanguinale, but it is best known and least esteemed as "crab grass" and "summer grass." It lies low before the mower and springs up elastic behind it,—refusing to be cut. It is a most aggressive expansionist, seizing upon any spot that offers it standing room, and crowding out everything that cannot resist it. It is most conspicuous and unsightly in the early fall, when it turns brown. By the end of autumn it is dead. The remains can be easily removed with a rake, for its roots have practically no hold in the soil. If fertilizer is now applied and grass seed thickly sown, the space may be saved from next year's invasion of this pest. There is no other remedy. Crab grass grows wherever other grasses will let it, and nowhere else.

In connection with weeds, some notice may be taken of moss, which sometimes becomes a source of trouble. Its presence is generally due to poverty of soil and insufficient drainage. Scarifying with a rake or a tooth harrow, and a liberal dressing with a mixture of lime and salt, will remove it, and a good application of stable manure will then put the ground into condition for re-seeding with success.

Earthworms

THE genius of Charles Darwin was devoted to a long and exhaustive study of the action of earthworms, and his experiments proved conclusively that their borings and castings have a very beneficial influence on grass lands. He estimated that over ten tons of dry earth per acre are passed through their bodies annually, undergoing, in the process, a grinding that greatly improves its quality as soil. While we recognize the annoyance caused by worm-casts on putting-greens, we hesitate to suggest any means of destroying these useful creatures. It is, of course, impracticable to do so over a large area, but on grounds where they are particularly troublesome the selection of fertilizers might be made with a view to keeping them under. The alkaline effect of wood-ashes is very irritating to them, and they cannot stand quick-lime. On putting-greens earthworms might be destroyed by saturating the ground with a kerosene wash; but, even there, it is probably as well to put up with their operations and to minimize the trouble they cause by brushing their castings off, or over, the greens lightly with a broom.

Fertilizers

THE essential elements of fertilizer for grass lands are nitrogen, phosphoric acid and potash, because these are the chemical elements which the grasses in growing appropriate in largest quantity, and which are present in the soil in smallest proportion. All the common manures and commercial fertilizers contain these elements in greater or smaller quantity, and are valuable proportionately. So that it really does not matter what kind of fertilizer is used, provided these necessary elements are rendered available as food for the plants. The matter of availability is very important, for it is obvious that the fertilizing constituents are useless unless they are in a form in which they can be assimilated by the plants. This fact suggests the propriety of using particular forms of manure or fertilizer, according to the conditions of the soil and the manner of application.

STABLE OR BARNYARD MANURE. This is decidedly the best and most economical form of fertilizer to use in the initial preparation of the ground for permanent grass lands. A too liberal quantity can hardly be applied. A very heavy dressing, plowed in in the fall, and another dressing cross-plowed in the following spring are recommended. This manure contains all the "essential manurial elements," but in a form more or

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less insoluble. They become available slowly and continuously, as the manure decays. Besides being one of the best direct fertilizers, this form of manure has a most valuable mechanical effect in improving the condition of the soil—the vegetable matter in it making stiff, clayey lands more porous and a too light soil more compact. But, although there is nothing better for plowing under, it is by no means as economical when used as a top-dressing. For when so applied the mechanical effect above mentioned is only slightly exercised, and much of the fertilizing properties is lost by the long exposure to the atmosphere. These considerations, and the extra labor involved in spreading in the fall and removing the coarse vegetable parts remaining in the spring, make the natural manure less desirable for surface application than some of the other forms of fertilizer. Its liability to contain weed seeds is still another objection to stable manure for top-dressing.

GROUND BONE. As a fertilizer for grass lands, ground bone comes next in importance to barnyard manure. In the preparation of the ground, a liberal quantity of the coarser grade should be well worked into the soil, where it decomposes slowly, furnishing a continuous supply of nitrogen and phosphoric acid. For top-dressing, the finer grade, known as "bone meal" or "bone flour," should be used. There is nothing better than an early spring dressing of this at the rate of half a ton to the acre. On putting-greens it might be supplemented by nitrate of soda, at the rate of 300 pounds to the acre, because the nitrogen in the bone is somewhat slow to become available.

CHEMICAL FERTILIZER. A high-grade complete chemical fertilizer is probably the surest and most effective spring top-dressing for grass. It contains all the essential elements in a highly concentrated and quickly available form. Half a ton to the acre is sufficient on an ordinary soil. To ensure even distribution, it should be mixed with equal bulk of dry earth. Such a fertilizer is also excellent for working into the soil when making putting-greens. Chemical fertilizer should be bought guaranteed or subject to analysis.

SHEEP MANURE. In the pulverized form in which it is

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usually sold, this manure makes an excellent top-dressing. It may be applied either in the fall or early spring, at the rate of three or four tons to the acre. It contains nearly twice as much solid matter as horse manure, and is very rich in phosphoric acid, nitrogen and potash. It also adds humus to the soil, which chemical fertilizers do not. Mixed with water,—1 pound to 5 gallons,—and a little muriate of potash added, it makes a most effective liquid fertilizer for putting-greens.

WOOD ASHES. The fertilizing value of unleached wood ashes is due to the 7 or 8 per cent of potash which they contain. To make a complete fertilizer it would be necessary to add some phosphoric acid and nitrogen. For this purpose 1,000 pounds bone meal and 300 pounds nitrate of soda to the acre would answer. Any quantity of the ashes may be used,—3 to 5 tons to the acre. They have an important mechanical effect in lightening the soil. Leached wood ashes contain only 1 per cent potash and have practically no fertilizing value. In purchasing, care should be taken to get pure and unleached ashes.

NITRATE OF SODA. In stimulating the growth of grass, nitrate of soda is the most quickly effective top-dressing, the nitrogen in this form being immediately available. It is extremely soluble, and penetrates deep into the soil, thus promoting a stronger and deeper root-growth. Two or three slight dressings at intervals throughout the season are recommended in preference to one heavy application. An equal quantity of bone meal mixed with it would supply the requisite phosphoric acid. For a putting-green 100 feet square, 40 pounds of this mixture would be sufficient at a time.

Rolling and Mowing

ROLLING.—As soon as the frost is out of the ground in the spring, the land should be gone over with a heavy roller. Winter frosts loosen the soil, and rolling is necessary to compress it again. If grass seed is to be sown, this should be done first and the rolling immediately afterwards. Frequent rollings are recommended.

MOWING.—All turf-forming grasses are improved, both in vigor of root-growth and in fineness of texture, by frequent mowings. It is impossible to say just how often the grass should be mown, as that depends upon the rate at which it grows. In the spring and early summer, when the growth is most vigorous, three cuttings a week are recommended for putting-greens. Too close cutting should be guarded against, however, especially during the hot summer months, when the roots require some top-growth to protect them from the burning sun. For the same reason it is as well not to rake off the cut grass, as it quickly settles about the roots and forms a valuable protective mulch. A good top-growth is also necessary to protect the roots from severe winter frosts. Mowing should therefore be discontinued in time to let the grass grow pretty long before winter sets in.

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scribed and furnished by us. We could justify this statement by thousands of testimonials similar to the few given herewith.

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(Signed) C. D. BEADLE,
Superintendent Landscape Department,
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SOME CELEBRATED LAWNS

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Gardener to John Sloane, Esq.

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Yours truly,

(Signed) HERMAN LIPS,
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SOME CELEBRATED LAWNS

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WESTBURY, L. I., Jan. 14, 1899.

MESSRS. J. M. THORBURN & Co.

Gentlemen:—The fifty acres sown with your lawn grass seeds have turned out a great success. During a long experience I have used large quantities of lawn seed, supplied by many leading firms, both on this and the European Continent, and I certainly have never seen better results than those obtained from your seed. I have had many inquiries as to where I obtained the seed, and I have no doubt my reply will bring you many new customers.

Yours respectfully,

(Signed) H. J. CORFIELD,
Supt. to Hon. W. C. Whitney.

Allen Winden Farm, Lenox, Mass.

LENOX, MASS., Feb. 2, 1899.

MESSRS. J. M. THORBURN & Co.

Gentlemen:—I am particularly pleased with the lawn grass mixture supplied by you last year. It came up very quickly and was entirely free from weeds, and gave us better results than any other seed we ever bought. I am glad of the opportunity of giving you my opinion of it.

Yours truly,

(Signed) A. H. WINGETT,
Supt. for Chas. Lanier, Esq.

Estate of Giraud Foster, Esq., Lenox, Mass.

LENOX, MASS., Jan. 30, 1899.

MESSRS. J. M. THORBURN & Co.

Dear Sirs:—In the fall of 1897, I sowed some eight acres with your Central Park mixture of lawn grass, and I am pleased to state that the result was highly satisfactory. I cannot speak too highly of growth and purity.

Yours truly,

(Signed) E. JENKINS,
Gardener to Giraud Foster, Esq.

Fertilizers

For Lawns and Golf Links

THORBURN'S GRASS FERTILIZER

Guaranteed to contain ammonia, 5 to 6 per cent; phosphoric acid, all soluble, $5\frac{1}{2}$ to 7 per cent; actual potash, $7\frac{1}{2}$ to $8\frac{1}{2}$ per cent; lime, sulphate of magnesia, soda, sulphuric acid, etc. Specially prepared for top-dressing lawns and golf links, imparting to grass a rich green color and vigorous growth. Being very powerful, half a ton is sufficient for an acre on soil not impoverished.

PRICE—In 167-lb. bags, per ton, \$48; single bags of 167 lbs., \$4.50.

PULVERIZED SHEEP MANURE

PRICE—Per 100 lbs., \$2; per ton, \$30.

UNLEACHED HARD-WOOD ASHES

PRICE—\$20 per ton.

BONE FERTILIZERS

Pure Ground Bone Meal. This finely pulverized ground bone is excellent for top-dressing. It decomposes very rapidly, and is more quickly effective than the coarser grade. **100 lbs., \$2; per ton, \$32.**

Ground Bone No. 3. This is coarser than the above, and is suitable for working into the soil. It decomposes slowly, furnishing a continuous supply of nitrogen and phosphoric acid. **Per 100-lb. bag, \$2.50; per ton, \$38.**

NITRATE OF SODA

Furnished always at market price, which fluctuates considerably.

N. B.—On large quantities of above Fertilizers special prices will be quoted.

Grass Seed Mixtures

PERENNIAL GRASSES FOR GOLF LINKS

For Fair Greens. We prefer to make special mixtures to suit the particular conditions of soil and situation. If correspondents will describe the nature of the land to be seeded, whether dry, moist or medium, and whether clayey, sandy or loamy, we shall recommend a suitable mixture, and quote price at same time.

For Putting-Greens. The finest possible mixture for putting-greens. Price per bushel of 24 lbs., \$5.

FOR LAWNS

Thorburn's Central Park Mixture. The finest possible mixture for lawns. It should be sown at the rate of 4 to 5 bushels to the acre. Price per bushel of 15 lbs., \$3.50.

Thorburn's Lawn-Restoring Mixture. A mixture of grasses peculiarly suited to take firm hold and grow quickly on hard, worn-out or burned spots. The bare spots should be well scratched or raked up, and this seed sown liberally. Cover very thinly with earth, and then roll or press down firmly with the back of the spade. Some Lawn-Restoring Grass Seed should be kept always on hand, and before every rain during the summer some of it should be sown on any part that may appear thinner than the rest. Price per quart-box, 30 cts.; per bushel of 24 lbs., \$5.

FOR MEADOW AND PASTURE

We invite country gentlemen to send for our circular of formulæ for permanent meadows and pastures. It gives the names of the grasses used and the proportion of each. They are all made so as to be sown at the rate of 35 lbs. seed to the acre. Our prices, *per acre*, are as follows :

Permanent Meadows —

No. 1.	For good land, neither too dry nor too wet,	\$4.25	per acre
No. 2.	For high and dry land	5.00	“
No. 3.	For wet, late land	4.75	“

Permanent Pastures —

No. 4.	For good land, neither too dry nor too wet,	5.25	“
No. 5.	For high and dry land	5.75	“
No. 6.	For wet, late land	4.75	“

Our General Catalogue gives full description and prices of all valuable natural and cultivated grasses and clovers. It is mailed free on application.

J. M. THORBURN & CO.

Growers of and
Dealers in

HIGH - CLASS SEEDS

Founded in 1802

**For nearly a century the leading Seed House
in America**

CATALOGUES MAILED FREE

J. M. THORBURN & CO.

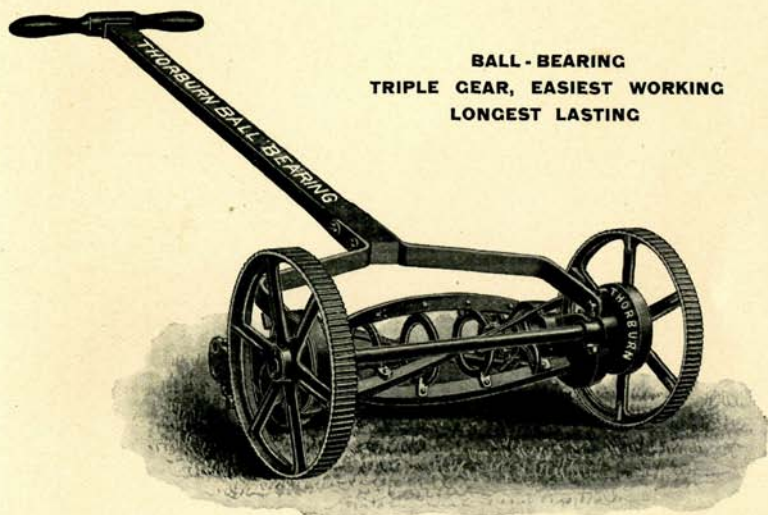
(Late of John Street)

36 CORTLANDT STREET, NEW YORK

ADVERTISEMENTS

The Thorburn Ball-Bearing Lawn Mower

THE BEST FOR PUTTING-GREENS



**BALL-BEARING
TRIPLE GEAR, EASIEST WORKING
LONGEST LASTING**

A 20-inch cut machine can be used with greater ease than a 16-inch cut old style mower.

A CIRCULAR DESCRIBING ITS SPECIAL FEATURES SENT ON APPLICATION.

PRICES.

14-inch cut	\$ 8 50	20-inch cut	\$ 11 50
16 " "	9 50	22 " "	12 50
18 " "	10 50	24 " "	13 50

Special prices to Golf Clubs requiring a number of them.

