THE BULLETIN

of the

UNITED STATES GOLF ASSOCIATION GREEN SECTION

Vol. 9 Washington, D. C., January, 1929 No. 1

Contents

THE BULLETIN is published monthly by the United States Golf Association Green Section, Washington, D. C., at Room 7207, Building F, 7th and B Streets, N. W.

Address all MAIL to P. O. Box 313, Pennsylvania Avenue Station, Washington, D. C.

Send TELEGRAMS to Room 7207, Building F, 7th and B Streets, N. W., Washington, D. C.

Subscription Price: In United States of America, Mexico, and West Indies, $4.00 per year; in all other countries, $5.00 per year.

Entered as second-class matter, April 21, 1926, at the postoffice at Washington, D. C., under the Act of March 3, 1879.

The New President of the United Sates Golf Association

Mr. Findlay S. Douglas, who was elected president of the United States Golf Association at the annual meeting of the Association held in New York City January 5, 1929, was born in 1874 at that famous shrine of golf, St. Andrews, Scotland. On leaving Madras College he

Findlay S. Douglas, recently elected to the presidency of the United States Golf Association

entered the University of St. Andrews, and after study hours practiced the game of golf so intensively and to such advantage on the old course that one year after arriving in the United States he won the 1898 Amateur Championship, and in 1899 and 1900 was runner-up. Mr. Douglas in these early days of golf became very much interested in exemplifying the ancient and honorable traditions of the game as practiced in Scotland, and competed in all of the leading amateur events thereafter. In 1901 he won the Metropolitan Golf Association Amateur Championship and repeated in 1903. He served as a member of the executive committee of the Metropolitan Golf Association from 1910 to 1914 and also in 1925 and 1926, while from

1922 to 1924 he officiated as president of the Metropolitan Golf Association. The United States Golf Association elected Mr. Douglas a vice president in 1926, and he was reelected to the same position in 1927 and 1928. He is also president of the Burns Society of the City of New York and of the Twenty Club. His best known club affiliations are the Apawamis Club, the Blind Brook Club, and the National Golf Links of America, of which he is a founder. The Green Section is highly indebted to Mr. Douglas for the personal interest he has taken in advancing its activities, and his genial presence while acting as chairman of the annual Green Section meetings during the past two years has served to lend an old-time dignity to the proceedings and the discussions.

Mr. Melvin A. Traylor, the retiring president, a well-known banker, is president of the First National Bank of Chicago and a former president of the American Bankers' Association. In retiring from the office of president of the United States Golf Association, Mr. Traylor, we are happy to say, does not lose contact with that Association, since, as a member of the Advisory Committee of ex-Presidents of the United States Golf Association, his knowledge and keen judgment on golfing matters will hereafter be available in helping to guide the continued progress of the national governing body.

Testing Turf With a Mechanical Putter

By John Monteith, Jr.

What grass will give the best putting surface? Probably every golfer who is sufficiently interested to know one grass from another and frequently many who do not know even that much about grass are likely to have most decided opinions on this subject. When called upon to furnish proof as to the superiority of such a grass from the putting standpoint alone, such an individual is soon forced back to the defense that it is the grass on which he personally can make his best scores. It is claimed that turf produced from one supply of bent seed is superior in putting qualities to that produced from seed of very nearly the same kind of bent. Advocates of fescue argue that its bristle-like blades produce the only true putting turf. Enemies of bent planted with stolons argue that there is always a tendency for the stolons to run in one direction, producing a "grain" which makes a slow turf when the putt is against the stolons and a fast turf for the putt rolling in the direction in which the stolons have grown. Annual bluegrass, to some golfers, affords the most accurate and uniform putting turf. Likewise each grass used on putting greens apparently has its supporters who are willing to argue interminably in its favor and as vehemently to condemn all others.

During the past season at the Arlington Turf Garden we have had several large plots which have been kept in as nearly perfect putting condition as possible. These plots all have the same degree of slope and are mowed and otherwise cared for in exactly the same manner. The only difference between these several plots is that each was planted with a different grass. Each plot is provided with a regulation cup, and visitors have been invited to choose the grass which looked like the best putting turf and then to compare his choice with the other grasses. Anyone who has any misgivings as to an actual

effect of the much-discussed "psychological influence" on putting would no doubt have seen some convincing demonstrations on those plots. Many professionals and amateurs of no mean putting ability have tested that group of grasses. If a golfer expressed a decided preference for any particular plot before trying any he invariably holed a higher percentage of putts on that particular grass than on any of the others; on the other hand, another golfer who preferred an entirely different grass usually succeeded in holing more putts on his favorite than on the others; all of which further supported the old verdict that putting is largely influenced by one's attitude of mind. It also demonstrated the utter futility of mere argument and especially the intense feeling that has marked some discussions as to the relative merits of various grasses in producing true putting surfaces, for when the evidence supporting any theory is so seriously overbalanced by the personal element no convincing decision is possible from argument.

The Arnott Mechanical Putter

There are many factors that must be considered before deciding as to the best grass for a putting green. Some of these are biological and have to do with the growing of grass, such as resistance to trampling, ability to withstand extremes of heat or cold, response to the soil in which it must grow, disease resistance, and many others. These are important, for it is undoubtedly self-evident that if there is found some grass which is ideal from the putting standpoint it may be impractical to grow it on greens in certain sections due to natural forces acting against it, and until those forces are understood and can be overcome by some artificial means such a grass would have no place on a putting green in such unfavorable regions.

The ultimate aim in developing putting greens is to provide an area on which a ball may be rolled with the greatest possible accuracy and a surface which will remain in good condition throughout as long a season as possible. It is therefore evident that even though a grass might be developed which possessed all the more desirable characteristics of growth, such as suggested in the preceding paragraph, but which at the same time failed to produce the kind of surface that is necessary for good putting, that grass should be tabooed. Much has been said and written about greens which are beautiful to look upon but which are wretched putting surfaces. It is now generally recognized that the surface of the soil, like the slate under the billiard

table cloth, is the part that largely determines the accuracy of the green. The speed, uniformity, and other minor characteristics of a putting green may depend chiefly on the quality of the grass growing upon it. In carrying out a program of turf improvement it is necessary to analyze the various factors to be considered, and it is important to know whether different grasses in themselves actually do exert any direct influence on putting, and if so, in what way.

The question naturally arises as to who shall decide which grasses shall be ostracized, if such action is necessary, and by what measure they shall be judged. Certainly appeals to a large number of good golfers avail little, since for every bitter enemy one meets he finds another golfer equally as quick to champion the cause of any particular grass chosen for inquiry. Such balancing of opinions indicates that some impartial method is needed for measuring the differences that may be found among the various grasses. During the season of 1928, Mr. R. F. Arnott, of the Upper Montclair Country Club, kindly furnished the Green Section with a mechanical putter which should do much toward settling some of these disputes. Mr. Arnott's machine simulates very closely the stroke of the ordinary putter, but unlike the human putter the machine is tireless and can continue in a test indefinitely without any deviations due to fatigue; it of course has the additional advantage over the human putter in that it has no "mental attitude" to handicap it in a decision; it has no favorites and can give impartial decisions; it sees no "grain," weeds, footmarks, or other imperfections; and above all it is looking for no alibi for missed putts.

Mr. Arnott has succeeded in making a machine which is effective but at the same time essentially simple. It consists of a pendulum mounted on an adjustable tripod, the details of which are shown in the accompanying illustration. Four long aluminum tubes were used in making the pendulum in order to make it swing in exactly the same plane. This pendulum swings from waist height, as does the usual putter. The power, or "wrist action," is furnished by a spring which connects the pendulum with a rod projecting forward from the tripod head. The length of the putt can be varied by using springs of different power, as well as by attaching the spring at different points along the rod protruding in the front. Lateral adjustment is provided for in the tripod head. At the base of the pendulum is the "putter blade." This blade can be adjusted to give a direct stroke, overspin, or underspin, and it swings in practically the same manner as does the blade of the ordinary putter. The height of the blade above the turf can be changed by adjusting the legs of the tripod. To operate the machine the tripod is set with the top level and at the desired height. The pendulum is allowed to swing free, and when it has come to rest a ball is placed just in front of the center of the blade. The spring is adjusted and the pendulum is drawn back and held by means of a hook attached to the back leg of the tripod. A slight touch releases this hook and the pendulum swings forward and strikes the ball.

To test the influence of different grasses on putting it is essential that the conditions for all be as nearly alike as possible. During the past summer the machine has been used on a series of plots at the Arlington Turf Garden, where the various grasses are grown on the same soil, with the same degree of slope (2 per cent), receiving the

same compost and care, and are all cut with the same mowing machine at the same height. In making the tests the machine is set up at the edge of the plot and a ball is repeatedly putted from the same position. The average distance of several (usually five) putts is taken as the distance for that setting on that particular grass. The machine is then moved to a corresponding position on a nearby plot and with the same spring and back-swing setting the test is repeated. After several repetitions of the above, both upgrade and downgrade on the different grasses, there is something more than mere personal opinions on which to base a judgment as to the relative putting qualities, particularly that of speed, of the various grasses. Before any scientific judgment is warranted from such tests it will be necessary to repeat them many times at different seasons of the year and in different localities. It is perhaps sufficient for the present to state that, from the preliminary trials made so far, it is safe to predict that many of the dogmatic assertions of the past are doomed to be decidedly modified within the near future.

As an illustration of the apparent failure of the golfer's eye to detect slight differences in speed of turf a single example may be cited from the experiences of last summer at the Arlington Turf Garden. Three good players who were visiting the garden together were asked to look over six different grasses growing in adjoining plots and to choose the fastest and slowest. Three of these grasses had been planted by the stolon method and three with seed, and all had just been mown. Each visitor chose the same plot, which for convenience we shall designate A, as the fastest, and agreed on the adjacent plot, B, as the slowest. The putting machine was then brought into the discussion. The machine reversed the decision for it showed that on both the upgrade and downgrade putts plot B was faster than A. In justice to these golfers, however, it should be added that the difference between the two grasses was small.

Soil Studies at the Rhode Island State Station

Many of our readers, especially those in New England, will be interested in the results of the golf turf studies which have been conducted for a period of years by the Rhode Island State College. These results were published by the college in June, 1928. For the benefit of our readers we are giving a brief review of the publication here, and suggest that those who are further interested write to the Agricultural Experiment Station, Rhode Island State College, Providence, R. I., for Bulletin 212, "An analytical study of the putting greens of Rhode Island golf courses," by Dr. B. E. Gilbert.

Especial attention has been given to the study of soil acidity and active soil aluminum (a chemical in a form which is toxic to plant growth if present in excessive amounts), in influencing the growth of turf grasses and certain weeds. It is pointed out in the bulletin that it is an open question as to whether weeds are discouraged by the acidity of the soil or by the presence of large amounts of active aluminum. Before investigating the matter further it was decided to make a chemical study of soils on which cultivated grasses were growing. In 1926 and 1927 samples of soil were obtained from putting greens of 22 Rhode Island golf courses and chemical analyses were made of the samples. Observations made in the collection of these samples are included in the publication.

A table is given showing the chemical analyses of the soil samples. In the table the soils are arranged in the increasing order of their active acidity. The table includes figures representing the lime requirement of each soil, the active aluminum present, the total nitrogen, the percentage of humus, and the green rating. A system of rating greens was adopted for the purpose. Another table gives the results of a mechanical analysis of the soil samples, showing the percentages of coarse gravel, fine gravel, coarse sand, medium sand, fine sand, very fine sand, silt, and clay. "No relation was found to exist between the fineness of the soil," the bulletin states, "and the rating of the greens. It would seem that with judicious fertilization, golf grasses will grow satisfactorily despite small differences in the physical state of the soil."

The chief interest in the study was that of the chemical analyses. The courses where sulphate of ammonia had been consistently used were all in the high-acidity group. The course "which had the least acidity had poor greens and had been subjected to applications of lime in previous years." It was found that "there was no evident relationship," to quote from the bulletin, "between the acidity of the soil and the active aluminum content with the golf soil samples. This is in agreement with the results already obtained with soils from different parts of the country." It was further observed that the practice of top-dressing with sand caused dilution of the soils, with the result that active aluminum content was affected. An inverse correlation between the finer portions of the soil and the active aluminum was found. It was found that the nitrogen had as much to do with the good growth of grass as any other factor. The total nitrogen data are of interest in this connection. It was noted that all courses of "A" rating were high in total nitrogen. It was also observed that the nitrogen content was closely linked with organic matter. "Since the best turf was found on courses which had a high humus content," the bulletin says, "it is doubtless of value to keep the organic matter of soil high."

A series of tests was made to determine the relative amounts of phosphorus in the soil available for plant growth. It was found that many of the putting green soils would benefit from the addition of superphosphate (acid phosphate). The fertilizer formula recommended as a basal application consists of 6 pounds each of sulphate of ammonia, superphosphate, and muriate of potash. This quantity is for 1,000 square feet and is to be applied in the spring before the grass starts growth.

A digest of the seeding practices showed a variety of grasses used for putting greens, chief of these being Rhode Island bent, redtop, and German mixed bent.

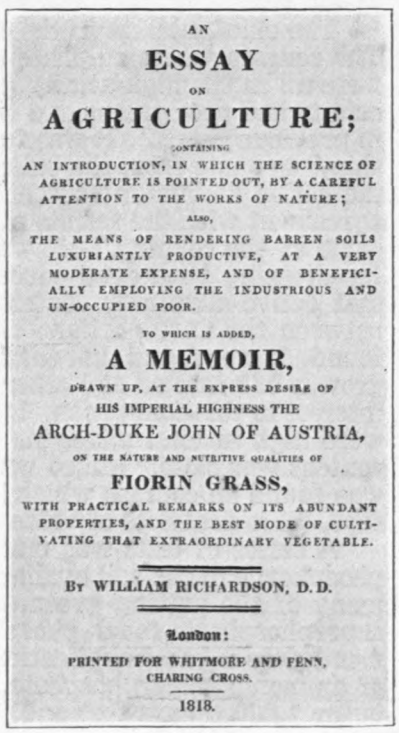
Only 4 of the 22 courses were found to have nurseries in which turf for use in plugging or returfing greens was grown. It was noted that all four of these had greens which ranked high in quality of turf. Thirteen of the 22 courses had water piped to their greens. Eleven courses reported brown-patch, and worm casts were troublesome on 12 courses.

A digest of the fertilizer practices is given, which shows a wide variation but a more or less general use of compost, local loam, and sulphate of ammonia. The use of some of the common fertilizers is discussed briefly. With three courses definite indications were obtained to show that weeds had been discouraged by the use of sulphate of ammonia.

Cultivating Creeping Bent a Hundred Years Ago

By John Monteith, Jr.

Since the bent grasses, seeded or planted with stolons, have become so universally used on putting greens in the United States they have been the subject for almost endless discussion as to their merits or failures as well as to the best methods for their culture. After reading or listening to the dissertations on bent grasses so frequent today it is amusing to turn back over a hundred years and find a creeping bent enthusiast propounding to the world the virtues of his favorite grass and telling of his discoveries—which are so often rediscovered in modern times. All bent enthusiasts would, no doubt, be interested in reading the book of 173 pages written by Dr. William Richardson and published in 1818, the title-page of which is here reproduced. The book is, however, not readily available to our readers; quotations from it will therefore be presented here, and rather freely.



AN

ESSAY

ON

AGRICULTURE;

CONTAINING

AN INTRODUCTION, IN WHICH THE SCIENCE OF AGRICULTURE IS POINTED OUT, BY A CAREFUL ATTENTION TO THE WORKS OF NATURE;

ALSO,

THE MEANS OF RENDERING BARREN SOILS LUXURIANTLY PRODUCTIVE, AT A VERY MODERATE EXPENSE, AND OF BENEFICIALLY EMPLOYING THE INDUSTRIOUS AND UN-OCCUPIED POOR.

TO WHICH IS ADDED,

A MEMOIR,

DRAWN UP, AT THE EXPRESS DESIRE OF HIS IMPERIAL HIGHNESS THE ARCH-DUKE JOHN OF AUSTRIA,

ON THE NATURE AND NUTRITIVE QUALITIES OF

FIORIN GRASS,

WITH PRACTICAL REMARKS ON ITS ABUNDANT PROPERTIES, AND THE BEST MODE OF CULTIVATING THAT EXTRAORDINARY VEGETABLE.

By WILLIAM RICHARDSON, D.D.

London:

PRINTED FOR WHITMORE AND FENN, CHARING CROSS.

1818.

The question naturally arises as to just why we print such ancient writings. It is partly because of historical interest for those with such likings, partly because the simple advice contained in the volume is not unlike the most up-to-date advice available on the subject today, and partly because many of the discoveries made by Dr. Richardson over a century ago have not yet been "discovered" on many golf courses where attempts are now being made to grow creeping bent.

Dr. Richardson's degree of D.D. indicates that he was not an agriculturist by profession; but he apparently became so interested in his hobby that he came to be regarded as an international authority on the subject of grasslands. He was interested in the development of agriculture as a means for bettering conditions in his native land of Ireland, and felt that one of the most promising fields for development was that of better pasturage, especially by the use of creeping bent, or "fiorin" as it is called in Ireland. Although by no means the first, Dr. Richardson certainly was one of the earliest of that group of humanity commonly designated as "turf nuts." He saw in "fiorin" an opportunity to convert tremendous areas of unproductive land into profitable meadows, and felt that the development of these wastes would largely solve the pressing national problem of his generation, namely of "employing the industrious and unoccupied poor." Needless to say, in his day putting green problems were unheard of, but if he had lived in this present generation he undoubtedly would have enthused over creeping bent, not as a

relief for the great mass of poor but rather for that wretched multitude constantly struggling against par.

RICHARDSON'S DISCUSSION OF THE PROBLEM FROM THE STANDPOINT OF AGRICULTURE

Dr. Richardson studied and wrote about creeping bent from the standpoint of the farmer raising it for hay. In reading his lines one can substitute "greenkeeper" or "green committee" where "farmers" are referred to, and "golf turf" for "meadows," and his writings will have surprising application today. In the first part of his book he discusses the need for new information on agricultural subjects. Much of the needed improvement which he foresaw has been realized in the many agricultural colleges and experiment stations throughout the world; but such developments in turf studies are yet in their infancy, so his suggestions are still almost as pertinent as when written. Introducing his subject he writes:

"This earliest, and most necessary of all sciences, ought, as I think, to be considered as consisting of three separate departments, distinct from each other; the THEORETICAL—the EXPERIMENTAL—and the PRACTICAL.

"The *First*, and *Second*, are at present quite absorbed by the Third, without any prospect of emerging in their proper and distinct characters."

He then discusses the separate field and the desirable characteristics of each of the three separate "departments." The theoretical department he calls upon to furnish the new ideas based on a general knowledge of natural forces. These ideas are then submitted to the experimentalist for trial.

"The EXPERIMENTALIST should be careful, patient, and diligent, without prejudices, or even opinions on the subjects before him; he is to make his experiments on the very smallest scale, so that he can diversify them without expence, and without having any interest in their success:—failure is to him exactly the same thing, as information is his sole object."

"The *third* character in the drama is the PRACTICAL AGRICULTURIST, of whom I complain that he has taken upon himself the whole three characters I mentioned: he treats the theorist with supercilious contempt, as presuming to obtrude his wild speculations into a department of which he considers himself as complete master.

"Hence improvements are discouraged, and discoveries that might have proved useful, are nipped in the bud.

"The *second* character I wish to introduce, does not yet exist; whence it comes, that discoveries which have been forced into attention, rarely meet with a fair trial; they are encountered by the *practical farmer* with prejudice, and even with jealousy. They are considered as obtrusions; and treated as uninvited, unwelcome strangers.

"Sometimes, indeed, the practical farmer pursuades himself, that he has assumed the character of the *experimentalist*, and tells us he has made the experiment;—that is, he has cultivated a field in a particular way: but it is not from solitary trials on a great scale, that information is to be obtained; experiments lead us to knowledge by *comparison;* they should be multiplied and diversified.

"Hence agriculture, *as a science*, is at a stand:—the present possessor of the field, perfectly satisfied with his own attainments, and in high admiration of his own practices, (often very good) does not admit improvement to be necessary, and indignantly rejects any innovation.

"He is encouraged in his contempt for theoretical speculations by the ridicule which a witty author throws on the agricultural *projectors* of his day."

He adds:

"I have shewn that the writers, both agricultural and botanical, of the seventeenth century, had taken such notice of the *agrostis stolonifera*, as might have induced their successors to form good expectations from it, or at least to pay it

some attention; but I was quite mistaken, for nothing similar followed. These latter gentry seem to be as little acquainted with the writings of their predecessors, as with Nature herself, and to have taken no pains to improve their acquaintance with her, either by actual experiment, or further observations on this grass."

He then expresses his opinions on agricultural "book-makers," whom he blames for blocking the progress of scientific agriculture. He points out that—

"Their object was to detail to the world what they *saw* and *knew;* they were not looking for *new* discoveries: in short, they were not *experimentalists,* and it is by a succession of patient experiments alone, that the properties of *new,* or *any* vegetables, can be found out and established."

Needless to say, it requires no stretching of the imagination to recognize in the above some of our modern writers who profess to be aiding greenkeeping but who in reality are using the ancient methods of obstructing progress.

It will interest many readers to know that even the earliest creeping bent enthusiast met with much criticism; but to his critics he replies:

"I have long ceased to notice the silly cavils against the culture of *fiorin,* so often brought forward by hostile and prejudiced ignorance."

He further observes:

"The incredulity of man is a more formidable obstacle to improvement, than any resistance thrown in our way by Nature."

Complaining of the lack of attention to turf problems, he writes:

"We have Sir Humphrey Davy's high authority for the wretched progress this important branch of agriculture has made."

Concerning this complaint it is interesting to turn to the criticism made by Dr. C. V. Piper over a century later. In 1924 Dr. Piper wrote: "The weakest place in our knowledge of forage production in American agriculture is unquestionably that relating to pasture and pasturage. * * * The better management and improvement of pastures is perhaps the most crying need of American agriculture." It is therefore apparent that Dr. Richardson's appeal failed to receive attention; and this lack of fundamental scientific information on turf for pasture explains the lack of understanding of problems on golf course turf.

Turf Diseases Suggested

It is of further interest to read his comments on plant diseases, especially since his remarks were largely in the nature of prophecy, for diseases in both animals and plants were then little understood. Many of the grass fans of today, in spite of the more advanced information available to them, can profit from Dr. Richardson's observations. He writes as follows:

"It is in adversity, when the vegetables he is cultivating are attacked by various disorders, that the agriculturist will find the benefit of the arrangement I have suggested, as it will enable him to meet with strength, and I may say, discipline, the difficulties he will have to encounter.

"That the vegetables we cultivate should be subject to disorders, is to be expected; since it appears, that not a single one of them is a native of the climate to which we have introduced them, all transplanted from regions more favoured by nature, habituated to a warmer, and generally a drier atmosphere.

"Thus then as the strangers we have transferred to our ungenial climate, have acquired disorders from which they were probably exempt in their own milder regions, it becomes the duty of the *naturalist,* that is, according to my

arrangement, the *theorist*, to investigate the causes of these disorders, and to exert his ingenuity in devising remedies, to which the *experimentalist* is to give a fair trial on a small scale.

"Many of these disorders, I apprehend, will be found to arise from *parasitic plants* attaching themselves to the one we foster, and intercepting its nourishment; others, I know, will be found to proceed from myriads of *microscopic animals* invading our plant, and forming their nidus in the most delicate and important parts of its structure; destroying its germ, or consuming and spoiling its farina."

His "parasitic plants" and "microscopic animals" may well be interpreted as the various fungi and bacteria which since his time have been found to cause diseases of plants.

Early Experiments With Creeping Bent

Concerning his early interest in grass ("gramina") production Dr. Richardson writes:

"In my early agricultural pursuits, I soon discovered that the *gramina* was a subject, on which the practical farmer, and his instructors the modern agricultural writers, all *seedsmen, nurserymen, and agricultural book-makers*, mostly from GRUB-STREET, were equally ignorant."

Referring to his first trials with creeping bent he states:

"I was now most sanguine in the pursuit of this new grass, and on November 15, 1806, after potatoes, laid down a rood with it, in the following way;—I raised fiorin roots in abundance, from my plots which had luxuriated greatly in the summer. I planted them in drills eighteen inches asunder, trusting that the *stolones*, with whose properties I was now acquainted, would, in the summer, shoot across the intervals, and clothe the whole surface.

"I was right; in May the stolones began to project across, and so effectually to cover the new ground, that the rows were soon no longer distinguishable; the thick fleece was uniform, and obviously a most valuable crop."

His early experience proved so encouraging that he experimented with the grass under widely different conditions and made extensive observations over a period of years. He found under some conditions—

"* * * that in the practice of years, the plant abated gradually of the luxuriance it first exhibited under them, shewing, after some time, that they were not to be persisted in with prudence."

Nevertheless his experience led him to write:

"I boldly say, that my conviction of the value of this grass has never been on the wane, and that from MAY 1806, when I first began to make observations upon it, until this moment, my expectations of the benefits to be derived from the discovery of fiorin, have been increasing, and my hopes at the end of every successive year more sanguine;—for, though I was obliged to give up some uses and applications, that I had previously recommended, others were perpetually occurring, that more than compensated for them; these variations being the consequence of the diversified, and I may almost say, contradictory habits of this strange vegetable."

"That its crops can be raised and kept up in continued luxuriance, on the same good grounds, on cheaper terms, and with greater certainty, than those of any other grass, I persist in asserting, having my *tenth* and *eleventh* successive crops *now* making up, without a trace of diminution in their value."

Referring to the wide range of adaptability of this grass, he writes:

"Fiorin, as I have often proved by respectable testimony, confirmed by my own ten years' experience, luxuriates equally at the *top of the mountain* and *bottom of the valley*.—Not so the rivals it has to contend with in lower regions."

Dr. Richardson soon learned the need for drainage. In spite of the fact that this need has been recognized for over a hundred years, how often do we find modern growers trying to maintain a stand of bent on putting greens where drainage problems are completely overlooked! He writes:

"The soil in which it delights most, is *loose, dry*, and of some *depth*, whether peaty or loamy."

Later he explains:

"I say the soil should be *dry;* this is indispensably necessary: but I prefer a soil *made dry* by many surface drains, to one naturally so; for a soil kept wet, by a retentive bottom refusing a passage downwards to the deluges of rain, is clothed mostly with the grasses that affect such soil, and some fiorin among them. Change the nature of the soil, from *wet* to *dry*, from *poor* to *rich*, and the paltry ungrateful aquatic occupants pine and vanish; while the fiorin, now in its favourite soil, comes forward in luxuriance, and takes possession."

In another place he writes:

"Though this grass preserves its existence, and even its health, under such opposite extremes, it luxuriates into value only under more favorable circumstances, for the soil in which it grows must be tolerably deep, and well drained, so as effectually to prevent any water stagnating about its roots."

He cites several instances where the grass had been submerged for long periods without apparent injury. In one case—

"I found, that after seven months' submersion, the emerging verdant sole was pure fiorin: a hard gravelly bottom precluded the aquatics; and other grasses would have been drowned."

Again he writes:

"I have had fiorin stolones sent to me from its [Chester Dee] muddy and sandy banks *below* high-water mark, for this strange grass agrees equally with fresh and salt water."

In spite of the apparent contradiction, he recognized that good drainage was essential to improve wet meadows for creeping bent. Concerning the improving of such land he writes:

"The only operation we have to perform on the area chosen, is to relieve it effectually from all under water, and to enrich the surface by good top-dressings.

"The former point we carry by frequent open drains, parallel to each other; their distance governed by the nature of the ground; if the subsoil be retentive, they should be the more frequent and deeper, not less than fifteen inches, and in the form of an *equilateral* or perhaps a *right-angled* triangle, that they may not be easily choaked up; and also that they may be readily cleared when necessary: the stuff raised in the formation of these drains is to be thrown into tall heaps, their distance from each other governed by the power of the labourer in pitching."

As an example of results obtained from such treatments he refers to—

"* * * a rich fiorin meadow, so low that its surface *never* rose more than twelve inches above the level of the perpetually stagnant water: no other crop that I am acquainted with could have been advantageously pursued on such low ground; yet my seventh crop is now promising well upon it."

He fully recognized the difference in response of creeping bent and what we know as Rhode Island bent on low, poorly drained land. Referring to this difference in behavior he writes:

"The vicinity of the water would, I am confident, prevent the obtrusion of the *agrostis vulgaris*, while it would not injure our amphibious *stolonifera*."

"DEEP ALLUVIAL BOTTOM occasionally submerged, would be far more productive in this way than in any other. I should hope that upon such grounds

the *agrostis vulgaris* would not obtrude, and occasional submersions would not injure my crop, *standing or cut*. Very frequent drains indeed will be required to let off the water *rapidly*, and to keep it as far distant as we can from the surface and roots of the grass."

He recognized, as many golf course men have recently learned, that wherever creeping bent occurred it could be made to take possession of the area, provided it were properly encouraged, without the aid of any seed, roots, or stolons. For such improvement he advocated surface drainage, top-dressing, and feeding, together with weeding. Open ditches were used rather than the tile drainage system of golf courses. The material taken from these open ditches was used for top-dressing. He says:

"For top-dressings, our resources are most abundant; the heaps I mention are upon the spot, and when improved, only require to be thrown by the shovel on the contiguous surface.

"Our sources for this improvement are *two, lime* and *ashes*."

In another place he states:

"Any manure suits it, and it agrees particularly well with *ashes* and *lime*, pure, and still better if mixed up in compost."

The ashes were produced on the ground, for the territory of which he wrote was well supplied with peat, which was piled up and burned to supply the ashes. That of course was before the days of commercial fertilizer. Concerning the cost he writes:

"We know that *ashes* alone, at threepence per cart, will give, pure or in compost, a good stimulating top-dressing on very reasonable terms."

He apparently recognized the influence of lime, especially in encouraging clover, for in one place he writes:

"I am unwilling entirely to give up *lime*, it is so encouraging to the kindly grasses, and particularly to the smallest of the clover tribe, known to be most grateful to all cattle; and the certainty of such herbage instantly following lime, is well known by the experiment perpetually made, of scattering some lime on a *peaty mountain*, to show that the place will immediately be covered with white clover."

When conditions were made favorable for bent he realized it was still necessary to help it by removing the worst weeds.

"Fiorin luxuriance, though very late in commencing, continues much longer in vigour than that of any other vegetable I know; so long, that its stolones form a thick mat on the surface, under which no other vegetable can exist:—thus, while coarser rivals are pointed out for *man* to extirpate, the fiorin itself suffocates, and exterminates the more diminutive ones, and remains in exclusive possession of the field.

"Still, however, that possession must be watchfully guarded, and the destruction of intruders never intermitted."

We might even read his lines to indicate that he was the first advocate of acid soil for bent, since he recognized that certain soils favorable to bent were less favorable to some weeds. He writes:

"In *cold, sour, low lands*, we have a better chance of succeeding, because the change we most operate on the soil, will be injurious to the rivals in possession, and we may be able to weed out new intruders."

Dr. Richardson records many other observations which are so often repeated in modern writings. For instance, he records the long life of stolons after they are cut and dried. He also recognized different types of creeping bent, although he did not isolate separate strains. He learned that irrigation improved the grass, but found

that too much water was harmful in the end, and he therefore abandoned irrigation.

CREEPING BENT FOR THE NINETEENTH HOLE

Dr. Richardson apparently saw possibilities in creeping bent which even our modern enthusiasts have overlooked or, possibly, keep to their own counsel.

"My friend the HON. GEORGE KNOX, our first chemist, undertook to find the comparative quantities of *saccharum*, in fiorin, and common hay: I furnished him with the former, and he procured some of the best common hay in the market.

"I called at the laboratory of the Dublin Society, where Mr. Knox carried on his operations. When he reduced the residue from the two hays to a consistence like tar, that from fiorin was like rich molasses, while the other residuum was a nauseous and bitter extract.

"Mr. Knox's brother, the BISHOP OF DERRY, encouraged by this, attempted to distill spirits from a decoction of fiorin hay, and completely succeeded.

"I now applied to the Revenue Board for a licence to set up a small temporary still, and made the experiment *eight* several times, and always succeeded. Many respectable persons called to witness the process. * * * All saw the still run, and tasted the spirits."

CREEPING BENT FOR THE METROPOLITAN DISTRICT

Many golfers wonder to whom belongs the credit or blame, as choice may designate it, for introducing creeping bent into this country. In this connection it is interesting to read Dr. Richardson's own words:

"Since I commenced this Memoir I am called upon to a new and very promising field, *the marshy* (and I presume alluvial) grounds bounding the great American rivers.

"Mr. SWARTSWOUTH of NEW YORK, encouraged, as he tells me, by the successful experiments of JUDGE PETERS and others on European fiorin grass, is most anxious to have my opinion on the probability of its succeeding on the marshy banks of the NORTH RIVER, so as to enable him to supply the city of NEW YORK with hay.

"I had formerly declined to encourage the gentlemen of BOSTON to cultivate this grass; for finding I had been unable to persuade my *English* pupils to keep the fiorin I was teaching them to cultivate free from weeds, I feared I should also fail in NEW ENGLAND, where the rush of summer vegetation was so much more powerful.

"I have given more encouragement to Mr. SWARTSWOUTH, and have transmitted to him full directions. * * *"

"DIRECTIONS FOR LAYING DOWN AND CULTIVATING FIORIN"

"In the first place, I wish the soil to be *deep*; for although fiorin roots penetrate but a little way below the surface, yet it is of very great importance, that the loose and well-tilled soil should reach much lower.

"The ground should be already *dry*, or *made* dry, by many open surface drains; for if water, whether atmospheric or other, be allowed to collect and stagnate about the roots of the grass, it soon becomes acrid, and highly injurious: this rule is *indispensable;* yet occasional floodings, or even long submersions, do not seem in the least to injure this grass, if rapidly let off.

"Fiorin must have the exclusive possession of the surface, that is, all intruders, especially other grasses, must be carefully weeded out, whenever they appear. I may add, the surface must be frequently *top-dressed;* and these renovations will abundantly repay the trouble and expence they occasion.

"In laying down fiorin crops, we neither use *seed* nor *roots*, when we can procure *stolones*, of which every cultivator has a superabundance; and the mode of proceeding is very simple.

"We commence at one end of the prepared area, and scatter stolones, at their full length, over a space extending along the fence, and about three yards wide.

I can not determine how thick they are to be spread; we know that nearly every joint will strike a root, and we must take care to secure roots enough.

"We now from the raw ground behind us take up shovelfulls of the loose surface soil, and scatter it over the stolones, so as *nearly* to cover them, and thus the business is done for so far: we then take up another breadth of three yards, spread strings over it, and cover them in the same manner.

"Where we have tender rich compost, ready prepared, it is more desirable to drop loads, or barrowfulls of this, through the field, and to cover the stolones from these, rather than from the plain surface.

"It is thus I have clothed all my own meadows with fiorin, and I know not any *annual* crop laid down so cheaply; for the stolones cost us nothing, and it is not a crop for one year only, as I have now my tenth and eleventh crop in full luxuriance; and the sole of grass never seemed to require any style of renovation save top-dressing.

"*Weeding*, indeed, must be repeated, as often as intruders appear; and I do not find the labour lessens with the age of the meadow—but my contractor seems to think he has a good bargain, at five shillings per English acre."

Where stolons are scarce the farmer "must use them more sparingly, and scatter the stolones thinly, or plant the roots at a greater distance; and to throw them into higher luxuriance, he must be liberal of his dung, or compost, which he can probably well afford, as, in the case I put, his area will be small.

"I would also in this case adopt the style I used in laying down my first crop; for by stretching them *in drills*, we economize the stolones: the early weeding by the *iron rake* will be very effectual, and the well-defined narrow drills will be easily weeded by hand."

"I have often been asked what is the best season for laying down fiorin. Here, as in many other parts of his business, the farmer has not always an option; he must do several things when *he can*, though it be not the most desirable time: to determine that, we must speculate a little, *à priori*, and consider what difficulties our favourite has to encounter in its progress, that we may contrive to avoid them; none from seasons, for this hardy grass vegetates at all seasons; the roots equally, and the stolones tolerably; at the worst, that is, in the middle of winter, the only difficulty to be dreaded is the rush of intruding weeds and grasses.

"The best possible season must therefore be that, when this HOST of enemies is able to do the least mischief, which I find is from the 8th of September to the 25th; for in this interval the efforts of vegetation are strong, and both fiorin and its rivals come forward vigorously; but the latter is soon destroyed by the winter frosts, to which the fiorin is quite insensible, and remains torpid, or rather languid, until it is with all other vegetables roused by the genial spring, and in its vigorous progress finds no rivals to encounter but those which are just beginning to vegetate—of course *diminutive* and *weak*.

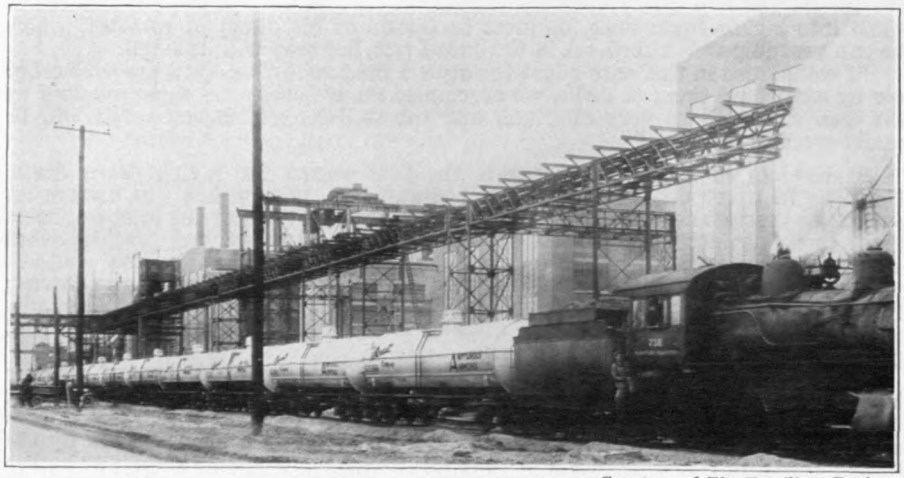
"Had we commenced earlier, the intruders would have time to acquire strength enough to sustain the frost, and the contest between them and the fiorin would have been carried on on equal terms."

"If we lay down in spring, we have the enemy to encounter in full vigour, and in this case I advise laying down in drills, that we may have the assistance of *the rake* in exterminating the weeds."

Approximately 257,000 short tons of cottonseed meal, or slightly more than 12 per cent of the crushings, from the 1927 cotton crop, were used as fertilizer. Of the 257,000 tons, about 170,000 tons were used directly on land and 87,000 tons by manufacturers in the production of commercial fertilizers.

Nature abhors straight lines, uniformity, and regularity. Golf was originally played on land unaltered by the hand of man. To regain the original charm of the game a golf course should abound in curves, variations, and simple irregularities.

Southern limit of bent grass and fescue.—One of the rather puzzling phenomena connected with all temperate perennial plants is that every one of them has a fairly definite southern limit. Thus timothy can not be grown successfully farther south than about the northern limit of cotton. Apples are grown a little farther south than timothy, while both the pear and the peach succeed considerably farther toward the equator. The southern limit of bent grass and red fescue is about that of timothy. Curiously enough, in the drier half of the United States all these plants succeed farther southward than they do in the eastern part of the country. It is not, however, safe to assume that because bent and fescue are good in southern California they will do well also in Florida. Theoretical explanations of the phenomena involve temperature, humidity, and length of day, and are somewhat technical.



Courtesy of *The Fertilizer Review.*

A Shipment of Synthetic Nitrogen

This train of tank cars, loaded with anhydrous or pure ammonia, is ready for shipment at the new nitrate plant of the Atmospheric Nitrogen Corporation, at Hopewell, Va.

The plant began commercial production of synthetic nitrogen in the fall of 1928 and is now operating on a production program which is greater than the maximum of 40,000 tons a year expected under most favorable circumstances at Muscle Shoals. The anhydrous ammonia is shipped in specially constructed tank cars to fertilizer factories, where it is used in making complete fertilizers. Since it is pure ammonia it is transported at relatively low cost. It is reported that 25 fertilizer companies are now using anhydrous ammonia in 70 plants. Some of it no doubt will reach greens and fairways during the coming season.

Soggy spots apparent in the turf in early spring are prime indications of inadequate drainage.

Haste makes waste. It is much cheaper and more satisfactory to extend construction or reconstruction work over two or three years than to waste money and pave the way to subsequent alterations in an effort to do it all in one season. It is on record that after a certain golf course was built and played on for a while it was decided to reverse the direction of play throughout. Another new course was soon reconstructed with the holes laid off at right angles to their original directions.

"Complete" Fertilizers to Contain More Nitrogen

For the benefit of clubs purchasing "complete" fertilizers the following is quoted from *The Fertilizer Review* of January, 1929:

"In the area known as District No. 9 of the National Fertilizer Association, ammonia in fertilizers is no more. This district includes the states of Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Kansas, Nebraska and Missouri. In that area it's nitrogen now. This small but important change in the designation of commercial fertilizers should be thoroughly understood by every fertilizer user for the change will no doubt also be made in the East and South during the next year or so.

"Since the beginning of fertilizer manufacture the terms used in stating the analysis or grade have been ammonia, phosphoric acid and potash. A 2-12-6 fertilizer has meant 2 per cent of *ammonia*, 12 per cent of phosphoric acid, and 6 per cent of potash. Now a 2-12-6 fertilizer will indicate 2 per cent of *nitrogen*, instead of 2 per cent of ammonia (equivalent to 1.65 per cent nitrogen). In making this change, fertilizer manufacturers believe that much confusion which has already existed in the use of these terms will be avoided. Most State laws require the fertilizer guarantee to state nitrogen. Soil scientists of both this country and Europe quite generally speak of nitrogen, instead of ammonia. A nitrogen basis in fertilizers is desirable from the standpoint of uniformity, universal usage and applicability.

"The change to a nitrogen basis makes the same fertilizer grades contain about one-fifth more nitrogen, the most expensive element in fertilizer. The 2-12-6, which before indicated 2 per cent of ammonia or 1.65 per cent of nitrogen, now contains 2 per cent of nitrogen, an increase of one-fifth in the nitrogen content. Similarly, a 6-8-6 fertilizer now contains 6 per cent of nitrogen, as against 4.95 per cent on the old ammonia basis. *The increase in nitrogen content is an important consideration in the purchase and use of fertilizers on the new basis.*

"Both nitrogen and ammonia are gases. Neither can be used directly by plants, but must be combined with other elements before they can be taken up as food. Household ammonia, the kind purchasable in bottles, is in reality ammonium hydroxide, or ammonia gas dissolved in water. Ammonia gas is one part of nitrogen by volume combined with three parts of hydrogen. By weight, ammonia consists of 14 parts of nitrogen and 3 parts of hydrogen. To convert ammonia to nitrogen, multiply by the factor .925. To convert nitrogen to ammonia, the factor is 1.21. In stating the composition of a fertilizer, nitrogen is preferable to ammonia because the latter implies that the plant food is in the form of an ammonium compound, which may or may not be true. Besides the ammonium form of plant food, there are the nitrate and the organic (natural and synthetic). The term nitrogen can properly be applied to all of these."

The little points count. A greenkeeper we know insists that the tee boxes and tee benches be moved now and then. He doesn't like the bare places that develop in the turf if these fixtures are not moved occasionally.

Fertilizer's Value Independent of Odor

Notwithstanding the odor of a fertilizer has little or nothing to do with its food value for the plant, there is still a large percentage of farmers and greenkeepers who regard it as an important factor to consider when buying fertilizers.

The National Fertilizer Association during the past summer conducted a survey in which over 48,000 farmers were personally and uniformly interviewed on the subject of fertilizers. These farmers were located in 34 states, including all those east of the Mississippi River, and Minnesota, Iowa, Missouri, Arkansas, Louisiana, Kansas, Oklahoma, and Texas. The results of this survey are reported in *The Fertilizer Review* of January, 1929.

It was found that 26 out of 100 farmers considered odor an important factor, 19 per cent considered size of bag important, and 14 per cent expressed a preference for color. To quote from the *Review:*

"It is pointed out by the Association that modern high-analysis fertilizer that has been shown by experiment stations to produce the most profit for farmers is very likely to be practically odorless. In fact, some of the new fertilizer materials, such as nitrogen that is fixed from the air, resemble sugar. Likewise, color has little to do with the effectiveness of commercial fertilizer in increasing the yield of a crop, hastening its maturity, improving its quality, or in making labor put on it more effective in growing a satisfactory crop.

"The Association also points out that those farmers who say they rely on their noses for determining quality got the habit when fertilizers were made largely of waste products. However, much of the fertilizer now on the market contains mostly straight chemical materials that have practically no odor. Therefore the farmer who trusts his nose in buying fertilizer is likely to find that his olfactory organ is not a capable judge of the most important factor, which is the ability of a complete fertilizer containing nitrogen, phosphoric acid and potash to feed a crop so as to increase the yield per acre and thereby lower the cost of production per unit to a minimum."

Fine Clay Particles Govern Fertilizer Needs of Soil

One of the reasons why even the wisest experts in the fertilizer field advise farmers and greenkeepers to make small-scale experiments on their own land, when this is possible, instead of launching into heavy purchases of untested fertilizers, is explained by Mr. P. L. Gile, of the United States Department of Agriculture.

"The soil," he says, "does more to fertilizer than was dreamed of in the old fertilizer philosophy. Soil is not to be regarded as a receptacle which merely holds fertilizer until it is needed by the crop. It seems that the soil as well as the plant has an 'appetite' or affinity for fertilizers. As soon as the fertilizers are applied, the soil starts changing the materials that have been prepared carefully by the fertilizer manufacturer, and what the crop gets is largely affected by the activities within the soil.

"Exact knowledge of the reactions between soils and fertilizer materials will help improve fertilizer practice. At the present time more is known of the net results than of the reactions themselves. It seems

probable, judging by many experiments, that the very fine clay material of the soil, usually called 'colloid,' is responsible for most of the changes that take place in fertilizers. The larger soil particles are comparatively inert. The colloidal material shows little affinity for chloride, sulphate, and nitrate; hence these fertilizer constituents are subject to considerable losses in regions where the rainfall is heavy. On the other hand, reactions take place between the colloids and other (basic) fertilizer constituents, such as sodium, potassium, and ammonium. If the colloid takes up some of the potassium of a fertilizer, it releases to the soil water an equivalent quantity of one of its own constituents, usually calcium or magnesium.

"The fact that there is an exchange of constituents between fertilizers and the soil colloidal material explains why a change in fertilizer treatment is sometimes beneficial. If a soil is fertilized for a series of years with a single fertilizer, the clay or colloidal material may become loaded with a single constituent and have less of other elements to release to crops. Soils on which crops are likely to develop nutritional disturbances following too heavy applications of lime or fertilizers (sometimes called 'weak' soils) seem to be those which contain a small quantity of colloid, or a colloid of low exchange capacity. The so-called 'strong' soils, on the other hand, seem to be those which contain colloids that insure a high capacity for exchange."

Caring for Trees on the Golf Course

Golf courses are at first generally blessed with an abundance of handsome forest trees. As the virgin underbrush is cleared from the woods to make room for fairways and putting greens, the trees, however, are robbed of the natural layer of decomposing vegetation which is the source of their food and water. Fertilization and irrigation must be resorted to in most cases if these native trees are to be retained in locations where the turf is kept cut short, as on fairways and tees and near putting greens. Often subirrigation is necessary to save trees in such locations, and it has been practiced successfully on some courses. Where subirrigation is impracticable or not deemed necessary, additional surface water beneath the trees can and should be applied. Soil beneath a tree is generally drier than soil in the open, due to the double draught on the moisture supply by the tree and the surface vegetation, and also to the interception by the branches of the natural rainfall coming from showers. There is also a double draught on soil nutrients beneath trees, and for this reason additional fertilization is called for in such locations. On the golf course this additional fertilization can perhaps best be attained by more frequent application of fertilizers under the trees. Of greater value perhaps are top-dressing with compost and, in early winter, spreading a mulch of thoroughly rotted animal manure on the ground over the spread of the roots of the tree. This mulch should be allowed to remain on the ground over the winter. Any residue that may remain the following spring may be raked away if it is deemed objectionable. Trees must also be kept pruned if they are expected to thrive. Dead branches should be carefully removed to make room for new growth and to prevent the spread of decay. No annual budget of a golf club is complete unless it includes an item to cover tree surgery, tree replacement, and general care of the trees.

"The high level of excellence of American putting greens, sustained under much more adverse conditions than prevail in any part of Great Britain, has long been appreciated as a particularly fine achievement of their greenkeepers."—*Golf Monthly,* Edinburgh, November, 1928.