

# THE BULLETIN

*of the*

## UNITED STATES GOLF ASSOCIATION GREEN SECTION

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### Harvesting Bent Seed

Golf clubs purchase most of their turf seed from retail dealers and are naturally primarily interested in the price, purity, and germination of the particular seeds which they purchase. In recent years there have been many claims as to certain superior qualities of grass seed, particularly bent, produced in different regions. Many of these claims have not been substantiated by results obtained, but they have nevertheless stimulated greater interest in the subject of where grass seed comes from. Believing that our readers will be more and more interested in the sources of some of the seed they purchase, we are publishing in this and the following number of the Bulletin several articles written by agricultural specialists who are personally acquainted with seed production in the principal centers where golf course seeds are harvested. There is much interesting information covering the grass seed industry brought out in these two numbers of the Bulletin, and this information should serve to acquaint those who purchase seed for golf clubs with the various problems that growers and dealers have to face in securing seeds which meet certain standards. Even a casual understanding of the methods used in producing seed enables the purchaser to deal with his seedsman more intelligently and may help him to avoid some of the costly mistakes that are so commonly made in buying seed of any kind.

The common golf course grass seeds are produced in relatively few regions. An unfavorable season or two in a comparatively small section of the country may therefore not only materially reduce the total available stock of seed but may noticeably affect the quality of practically all the seed on the market. Such an unfavorable period may seriously affect the prices as soon as the surplus stock of old crops is exhausted. This dependence on weather conditions largely explains why one new course may be planted with a poor quality of seed for which the club was obliged to pay a high price, whereas another club a year or so later might secure for its new course a high-grade seed at a relatively low price. Such differences can not in fairness be attributed to activities of the retail seedsman.

A comparison of methods used in bent seed production, as pointed out in this number of the Bulletin, will explain why the purchaser should not expect his seedsman to be able to deliver seed of the same purity and germination from every source. German bent represents a bulking of collections made by many harvesters working in different sections gathering their crop from wild grasses. In contrast to this hand-harvesting of wild grasses is the cultivation, in some seed-producing regions, of single species of bent and the systematic inspection and rogueing of fields to keep out unwanted species. This latter method enables the producer and dealer to deliver a more uniform product than is possible by the other method; and if any irregularities appear in such seed supplies they may safely be attributed to deliberate deception or to ignorance on the part of the grower himself or someone along the customary long route between the grower of the seed and the golf course.

Most golf club officials are more interested in the different sources of seed of the bent grasses than of the other seed used on courses. This greater interest may be explained as partly due to the higher price paid for seed of bents and partly to the more intensive sales

efforts used to dispose of this seed to golf clubs. Because of this wider interest in bent seed we are devoting an entire number of the Bulletin to the subject of bent seed production. The seed of other grasses used on golf courses will be considered in the following number.

There are five principal bent-seed producing regions in the world and the methods used in harvesting seed in four of these regions are described in this number of the Bulletin. The fifth region, which is not reported on here, is New Zealand, from which large quantities of colonial bent seed, with a high percentage of purity and germination, are imported into the United States. The descriptions of the methods used in the four bent-seed producing regions, however, bring out the variety of methods which range from hand-harvesting to the highly developed machine-harvesting and threshing by means of the combine. It is well to compare the methods used in harvesting bent seed with those used in the production of the closely related but much cheaper seed of redtop.

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## Oregon Bent Grass Seed Certification

By G. R. Hyslop  
Oregon Experiment Station

The identification of the seeds of the bent grasses has always been a problem. It has become acute with the strong demand for seed and the consequent temptation to adulterate that has developed with the higher prices. The seeds are so small that examinations with the naked eye are of little use in the identification of the various types and varieties. Such examinations serve only in the detection of the presence of inert matter and foreign seeds.

The first bent grass seed harvested in Oregon as such was threshed in 1924, and our problem of identification came shortly thereafter. When the seed of the Oregon grown seaside creeping bent grass was first placed on the market it was found that seed analysts, including our own analyst at the Oregon Experiment Station laboratory, were identifying it as redtop. Up until that time, we did not know of the very great similarity between the seed of the two grasses, and it had not been a problem with us. At the request of Lyman Carrier, one of our staff members examined a number of seaside creeping bent fields and drew samples from every sack of seed harvested that year. A composite sample made from all these samples was examined by our analyst and by F. H. Hillman, of the seed laboratory of the United States Department of Agriculture. The composite sample proved satisfactory, and small lots of it were subsequently sent to every seed analyst and to the more important of the seed companies throughout the United States as an official type sample of Oregon grown seaside creeping bent grass seed. With the issuance of these official type samples, seed analysts soon learned to distinguish lots of seaside creeping bent grass seed that were being offered, from lots of redtop seed, and the immediate problem for the one producer was solved.

Immediately the apparent profit in the bent grass seed crop attracted a number of dealers to Oregon, and it was feared that some of them might be tempted to mix redtop into the much more expensive bent grass seed and the reputation of the Coos County seaside creeping bent producing district would be jeopardized. Seed certification was discussed in 1925 in order that protection of the industry

might be assured. The plan for certification consisted of a field examination to be followed by a careful examination of the threshed and cleaned seed and the sealing of the bags of seed. This plan was considered feasible, and the first field inspections were made for a small acreage in 1925.

The crop was exceedingly short that year and only a few thousand pounds were harvested. It was all sold without the sealing and so none of the seed was actually carried through the certification. In 1926 a loss of two staff members during the certifying season made it impossible to make any inspections of the seaside creeping bent fields. However, the first inspections of the Astoria colonial bent grass fields were made. These field inspections were made in the summer, and during the fall and winter the clean seed was inspected and sealed. This was the first bent grass seed to be certified in the United States. Certification of the seaside creeping bent grass was carried through to completion in 1927, and most of the Oregon acreage of each grass has been inspected for certification each year since that time. In each of the producing districts the beginning was made by one person or one organization, and as time has gone on others have engaged in the production and cleaning business and this has complicated the certification problem.

The development of the seed certification has been something of an evolution, and we are improving the work each year. In the first years, we simply made a field examination by walking through the fields and arriving at an empirical decision as to the quality of the field without actually having any very definitely established standards. Now we go through the fields with a tally checker in each hand. We check each step that is made during the period of examination with one instrument and use the other to check each step that contains any other bent or redtop. After having walked through representative parts of the field so that we can see any qualities or any differences, and having taken the count on what may be considered to be a fair sample of the field, we use the counts recorded on the tally checkers in arriving at a figure which will determine whether or not the field shall pass.

The standards for this certification are very rigid, in that we are very jealous of the products of the state and want them to go into the hands of customers who will be well satisfied and who will send in repeat orders. With this in mind, we do not pass any field as pure bent grass if it contains more than a very slight trace of redtop. Few fields that pass contain any at all. We do not pass any field as pure bent grass if it contains more than one-half of one per cent of other kinds of bent grass that may be recognized upon field examination. As a matter of fact, most fields offered for examination are so pure that but few are found which contain so much mixture as to require rejection. In the event that fields contain more than the permitted amount of mixtures and are harvested for seed, we record them as mixed fields, and, if the producer desires, will put on a "red statement" tag, which is not a "certification" tag but which indicates just what was found. The red tag is also used for seed that may be slightly musty or that may contain excess inseparables. In some instances this has helped to sell the seed, as the mixture is usually below 5 per cent.

The field inspector makes a record of the acreage as well as his

findings in the matter of purity and also usually makes an estimate of the possible yield of the field for checking purposes. After the fields are passed for certification, the grower is required to keep each lot separate until it has been examined after threshing and cleaning.

When the seed is threshed and cleaned, it is put in unpatched seamless bags and the inspector examines each bag for mixture or adulteration and for purity and condition. Procedure is as follows: A regular compartment grain tryer, such as is used in sampling wagon boxes or carloads of grain, is put to the bottom of each 50- or 100-pound sack of the bent grass seed; or if it is in bulk numerous samples are taken by thrusting the tryer to the bottom of the



In a bent-seed warehouse at Astoria, Oreg. On the table are samples of seed ready for examination. In the rear and to the left are sealed bags of seed; at the right are unsealed bags. A seed sampler, or tryer, is standing against the post in the center

bin and withdrawing the sample. This tryer has a number of compartments, and upon being withdrawn from a 100-pound sack of bent grass is emptied upon a large sheet of paper on the inspection table. The table is usually filled with samples, and a general or naked-eye examination is made. If the seed looks uniform and sufficiently free from foreign material that it warrants a microscopic examination, the latter is made with a high-powered binocular. If any bag or any part of a bag shows substantial differences in quality or the presence of too much foreign material or inert matter, the entire bag is rejected for certification until it is reconditioned.

An examination of a single field of vision of the powerful binocular microscope shows about 22 to 26 seeds in the field of vision at one time. From four to six or eight fields of vision are examined in each of at least three of the piles deposited on the table by the tryer. In some cases all of the piles are examined. In this way all piles are given the general examination, and there are from three to six microscopic examinations of at least four microscopic fields on

each sack of each lot, and any sack that does not come up to specification is rejected.

Sacks that are passed are immediately secured by twisting a soft iron wire tightly around the top of the sack, using a special tying tool. Then the numbered and signed tag is sealed on the bag by passing a lead rivet through it and the loops on the ends of the tightly twisted tying wire and then crushing the rivet seal with a clamping tool or seal press. This latter method of sealing is a new one developed by the writer for this year's crop and is substantially superior to any of the seals we have seen in use so far. Formerly a combination wire tie and a lead and wire seal were used, but immediately upon breaking the seal the tag could be placed on another bag and no one would be the wiser unless he examined the actual seal very closely. The seals used carry the name Oregon Agricultural College, Corvallis, on one side, and on the other side the number of the seal press.

In the event that bulk seed is examined or in the event of the sealing of small lots as 5- and 10-pound bags, the examination is made in 100-pound bags or in bulk and, after passing, the seed in sacked and sealed immediately under the supervision of the inspector.

We believe our new sealing system precludes the second use of the tags and offers very much greater assurance that the neck of the bag may not be opened, the bent grass seed drained out, and redtop substituted.

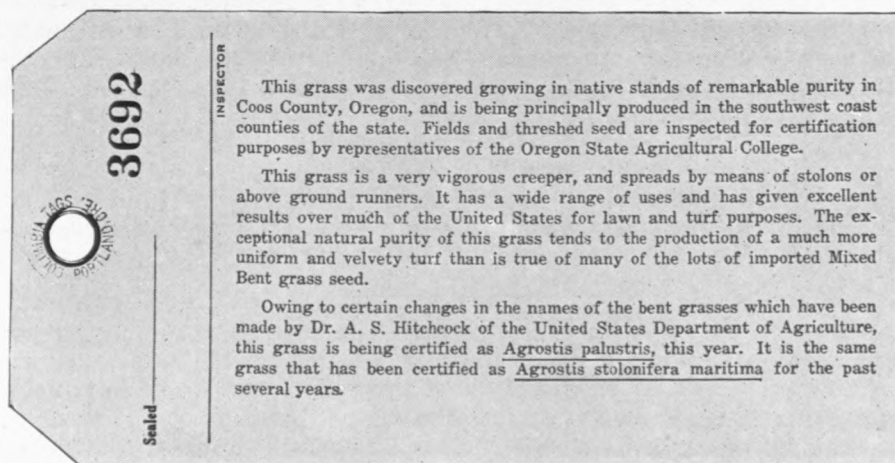
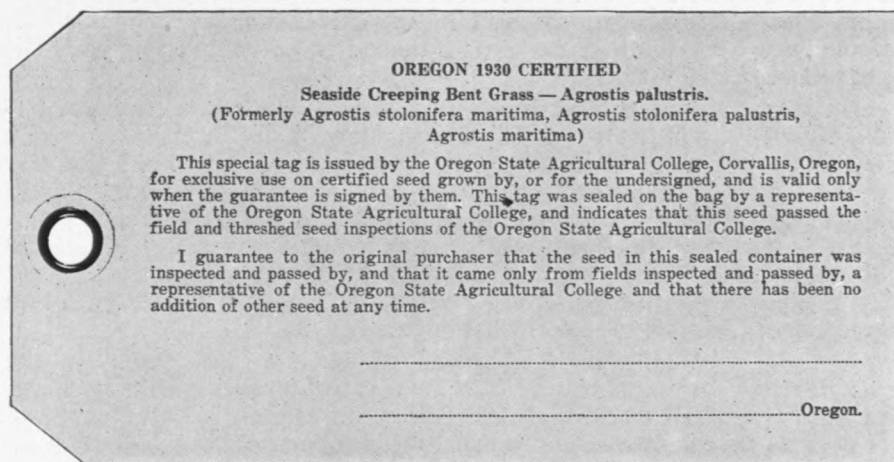
We are seriously contemplating the use of paper bags for next year, as the paper bags seem less subject to tampering than the cotton ones.

When we began the certification of bent grass seed, identification was not on a very satisfactory basis. It was and is relatively easy for seed analysts to distinguish the seed of Astoria colonial bent grass from many of the other bents because of its peculiar characteristics. On the other hand, the seaside creeping bent identification was not as easy. As experience has been gained we now feel that we are able to detect very small quantities of redtop or other bent grasses in the seaside creeping bent seed and expect that in the course of time we may be able to eliminate the need for the expensive field inspections. The seaside creeping bent seed has a very distinctive callus and crease near its base, and there is also a very distinct keel in a good many cases. There is such a substantial difference in the callus and keel characteristics between the seaside creeping bent grass and the redtop that identification is getting to be pretty positive, and now even relatively small percentages of impurities can be detected.

The standards that have been adopted in connection with our certification were considered to be very rigid a few years ago, and some of the growers criticized them because of the strict requirements, particularly in connection with some of the weed seeds difficult to separate. However, we have consistently adhered to this rigid certification system and aim to pass no lots of seed which carry more than an estimate of one per cent of weed seeds.

As certification is carried on in warehouses, on docks, in barns, and in vacant store rooms, it is not possible to carry around delicate balances and use them, and the practical use of time precludes the making of complete and detailed analyses. Experience has shown us

about how much foreign seed may be present and still not exceed one per cent. When, in the judgment of the inspector, there is more than one per cent of weed seeds in any part of a bag, the bag is required to be further recleaned. This was a rigid standard in the early years, but now most of the growers are so successful in their cleaning operations that there are a great many who are producing a substantially better quality of seed. The Oregon grown seed containing even one per cent of weed seeds is so much better than much



Front and back of certification tag used by the Oregon State Agricultural College on bags of certified seaside creeping bent seed

of the bent grass seed that is commonly offered on the market that we consider it very good and are planning to continue tagging such seed as blue-tag seed. However, in view of the fact that a large number of producers are putting seed on the market with not more than two-tenths of one per cent of weed seeds, we have decided that a purple-tag grade with probably not more than an estimated 25-hundredths of one per cent of weed seeds will be inaugurated. Seed



of this purple-tag quality is so good that it will do away with a great deal of hand weeding in the greens, and of course it will command a better price.

For some of the other turf purposes, such as fairways, lawns, courts, parks, polo fields, and landing fields, the seed with not more than one per cent is good; and indeed it is seed of excellent quality for a large percentage of the putting greens as well.

In the evolution of the standards, we have set up the one standard on purity or freedom from weed seeds. The field standard of not more than a very slight trace of redtop and not more than one-half of one per cent of other bents is adhered to in connection with the cleaned seed inspection.

In view of the fact that these bent grasses contain from 5,000,000 to 6,000,000 seeds to the pound, and in view of the fact that so much seed is used in normal sowings, we do not consider a small quantity of inert matter to be serious unless it is of such a character as to injure the appearance of the seed. Therefore we have not set a definite standard on inert matter, but depend a good deal on the judgment of the inspector, limiting his approval to lots that do not carry excess quantities of inert matter or that do not present a bad appearance because of the inert matter.

We will probably include bushel weight or test weight in the specifications for another year. Test weights are being made on the seed this season and most of it is running from 34 to more than 38 pounds to the bushel. Practically no seed weighing less than 32 pounds to the bushel has been passed for certification. Definite specifications of this kind will probably be included by next year.

We pass no seed as "certified" that is wet, heating, hot, or musty, or that is otherwise out of condition. We may place a red explanatory tag on some such lots, but do not place blue tags on any lot not in good condition.

The whole idea in connection with certification has been to enable the various growers to put a standard product on the market and to assure the customer that he is getting a satisfactory product. By means of careful certification and high standards we hope to maintain a continued profitable market for the Oregon bent grass seeds.

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**How birds help the greenkeeper.**—The intense activity and the rapid digestive powers of birds are responsible for the large amounts of food consumed by them. Around the golf course we ordinarily do not think of birds as an asset to the maintenance of the course, yet most birds are actually a factor of no little consequence in controlling enemies of the golfer. With respect to food habits, birds may be divided into three classes—the seed eaters, the insect eaters, and the rodent destroyers. Among the common seed eaters are the mourning dove, the cowbird, the meadow lark, and the field and song sparrows. Investigators examining the stomach of a dove found 6,400 foxtail seed, and in another 9,200 seeds of various plants were found. Foxtail is considered a weed on golf courses. Among the insect eaters are the bluebird, the robin, the blackbird, the yellow warbler, and the nuthatch. The rodent destroyers include the horned owl, the screech owl, and the various hawks.



## Bent Grass Seed Production In Rhode Island

By T. E. Odland

Rhode Island Agricultural Experiment Station

The production of bent grass seed in New England dates back to early Colonial times. This grass was first discovered on the North American continent in the small State of Rhode Island, and for many years was known as Burden grass. It was early recognized as a valuable pasture grass in New England. Definite mention of the grass is on record as early as 1747.

Much of the seed in the early years probably came from Prudence and Jamestown islands, from the Island of Rhode Island, and from southern Connecticut. It was here that seed in considerable quantities was chiefly found when the large increased demands for bent seed developed some 25 or 30 years ago due to the growing demand for it for fine turf production on golf courses, municipal parks, playgrounds, and fine lawns. The seed gathered at that time was chiefly from native stands where bent had become established and had persisted long after other grasses that may have been seeded into it had disappeared. At the present time, however, the seed from this region comes chiefly from fields



Outline map of Rhode Island showing the principal areas (shaded) in which bent grass is being grown for seed



Commercial producers of bent seed in Rhode Island have received much assistance from the United States Department of Agriculture. Prof. F. H. Hillman (center), of the seed laboratory of the department, is demonstrating to a group of producers, in a field of velvet bent, some of the finer points needing consideration

specially planted with bent seed and carefully taken care of for seed production. Due to competition from foreign countries, chiefly Germany and New Zealand, the seed production did not flourish or keep up with the demand, for it was impossible for the southern New England farmer to produce this fine turf grass seed under conditions which required him to compete with protected industry for his labor supply and at the same time to compete in price with the foreign seed produced with cheaper labor. When the supply from Germany was cut off during the World War the home industry was rejuvenated and in-

creased amounts were produced. The increasing production of bent seed continued for several years after the war. However, as seed from Germany again began to be imported in larger quantities, and as New Zealand also began exporting large amounts to the United States, the Rhode Island growers began to find it more difficult to meet this competition and consequently less seed was produced. The highest production was in about 1923 and 1924, when probably as much as 125,000 pounds of colonial<sup>1</sup> (Rhode Island) bent seed was produced in the State of Rhode Island. The amount grown has gradually fallen off, until in 1929 not more than approximately one-third of this amount was produced.



Part of the breeding nursery at the Rhode Island Agricultural Experiment Station in which improved strains of bent grasses are under development

As the production of the native-grown colonial (Rhode Island) bent was becoming less remunerative to the farmers, the areas devoted to velvet bent and creeping bent were increased, since these seeds were not being imported into the United States unmixed with other varieties of bent. The production of different varieties of bent seed during the 1930 season is estimated at around 10,000 pounds of velvet bent, 5,000 pounds of creeping bent, and 50,000 pounds of colonial (Rhode Island) bent. Also large areas are devoted to the production of creeping and velvet bent stolons. The shaded areas in the accompanying outline map of the State of Rhode Island indicate the regions where the bent seed is chiefly produced at the present time. With the new tariff on bent seeds in effect, more interest is being shown in the seed-producing industry of the state. If this tariff succeeds in enabling the growers to receive a price for their product that will enable them to grow the bent seed at a fair profit, no doubt the amount produced in the state will increase rapidly in the next few years.

<sup>1</sup> The author prefers "Rhode Island bent" as the designation of the grass in question. In accordance with the editorial policy of the Bulletin, however, it is considered desirable to conform to the usage recently adopted by the United States Department of Agriculture.—EDITORS.

Producers of bent seed in Rhode Island have found that the growing of seed of any particular species of bent grass calls for considerable skill in order to obtain a first-class product. It is necessary to start with a field where there is likely to be as small a percentage of volunteer grasses as possible. During the growing season fields must be carefully gone over to rogue out stray plants that can be detected by the eye. The threshing and cleaning of the extremely fine



Velvet bent being grown for seed production. Near West Kingston, R. I.



Plots of bent grasses at the Rhode Island Agricultural Experiment Station in which improved strains of bent grasses are under development

bent seed require specially designed threshing and cleaning apparatus. The crop is allowed to ripen fully in the fields, and at the proper time it is mowed, raked, and handled much as is ordinary hay until threshed. In the process of threshing, the bent grass hay is run through the thresher and the seed is stripped off and separated from the straw. The seed then is taken to the cleaning apparatus, where it is run over extremely fine sieves while the chaff is taken out with the aid of a carefully regulated air blast which requires operators of intelligence and skill.

In an earlier issue of the Bulletin (December, 1928) the experi-

mental work in the production of bent grass seed which was being started at that time at the Rhode Island experiment station was described. These experiments have been carried forward as planned and several new features added. The tests of the different strains and varieties have given some interesting results. The first crop of seed, which was harvested in 1929, was rather small, as was to be



Experimental plots of bent grass being grown for seed production at the Rhode Island Agricultural Experiment Station

expected. In 1930 a second crop was harvested and some very fine yields were obtained. At the present writing the cleaning of the 1930 seed crop has not been completed and therefore the yields can not be reported. Yields up to well over 100 pounds of seed to the acre were obtained in several cases. The Kernwood strain was the best yielder among the velvet bents, while the Washington strain was one of the leading varieties among the creeping bents. In the fertilizer test on colonial (Rhode Island) bent grown for seed, it was found that variations in the amounts of phosphorus and potash applied had little influence on the quantity of seed produced. The amount of nitrogen, however, greatly influenced the quantity.

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Seated on the clubhouse veranda on a summer night who has not been led to wonder at the strange unison maintained by a swarm of fireflies in flashing their lights? It would almost seem as if they had gotten together and arranged beforehand to flash all at a given signal, and then to renew their flashes all after a uniform interval of time had expired. It is hard to believe they can produce this effect voluntarily. An observer in Massachusetts has suggested that the simultaneous flashing in a swarm of fireflies may be controlled by the same conditions that control the action of a photoelectric cell; that is to say, the light from the flash of one firefly immediately and of its own accord causes nearby fireflies involuntarily to flash in unison.

## Bent Seed Production in Germany

By G. C. Edler

Bureau of Agricultural Economics, United States Department of Agriculture

Bent seed is produced mainly in central and south of west-central Germany, where the crop grows wild in the forests. The heaviest producing districts are situated mostly in Hesse, Thuringia, and Wurttemberg. Smaller quantities are produced in Rhine and Brandenburg provinces in Prussia and elsewhere. Darmstadt is in the center of the most important district. A drive from Darmstadt to Aschaffenburg would take one through the most important district. Another district could be seen by driving from Gotha to Gross-Tabarz and Fischbach, situated in the heart of the Thuringia district.

The seed is harvested by men, women, and children living in villages adjacent to the producing districts. They do much of their collecting on Sundays and after work in the evening. The crop is cut by hand and either put into a bag or tied into bundles and allowed to dry for two or three days. Collecting usually begins in August and continues until the first cold spell, perhaps in November. The seed can stand much wet weather without having its germination impaired, but rains darken the seed. The seed does not shatter easily, hence harvesting may be extended over a long period without danger of losing much seed. Because the plants are scattered here and there in the woods it is very difficult to estimate the average acre yield. The heaviest deliveries of seed by the collectors to the dealers usually occur in September and October. The recleaned seed is ready for export in December.

A small percentage of the crop is threshed by a large grain thresher and some on a hand thresher, but most of it is flailed by hand. Flailed seed usually is considered to be the best because it contains less chaff. When threshed a second time some of the seeds are broken, which lowers the market value. The seed is delivered to the dealers at Darmstadt, Aschaffenburg, and other such points with a purity of from 20 to 40 per cent, and the "rough" seed shrinks about 50 per cent in the cleaning operation. Good recleaned seed tests from 70 to 80 per cent in purity, according to some of the leading dealers.

The seed for export is put in bags, 50 kilos (approximately 100 pounds) to the bag. Prior to the war much of the best seed went up the Rhine by boat and was shipped from Rotterdam. This may explain why some of the Dutch firms have exported bent seed because, according to the best information obtainable, this seed has been produced in only small quantities, if at all, in Holland. At the time (1924) the writer was in Germany, practically all the seed was being shipped via Hamburg because of delays in passing through the occupied zone en route to Rotterdam. German exporters received from \$100 to \$150, mostly \$100, for 100 pounds of bent seed in 1923, but prices later declined sharply, sales in June, 1924, being at \$32 to \$45. Wholesale spring prices of bent seed in the United States for the years 1925 to 1930, inclusive, were mostly as follows: 1925, \$55 to \$65; 1926, \$110 to \$125; 1927, \$53 to \$60; 1928, \$48 to \$50; 1929, \$50 to \$60; 1930, \$55 to \$65. At the present time, leading dealers are quoting German mixed bent mostly at \$75 to \$85 for 100 pounds.

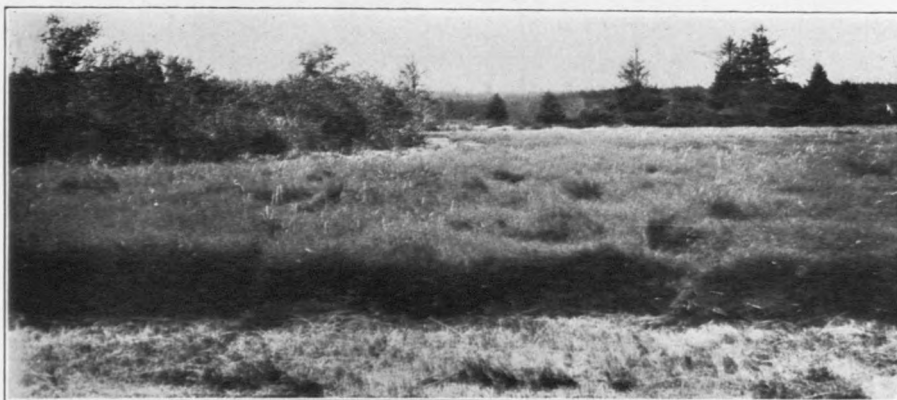


## Bent Grass Seed Production in the Pacific Northwest

By H. A. Schoth

United States Department of Agriculture

No literature on bent grass seed production in the Pacific Northwest is complete without reference being made to the late Dr. C. V. Piper. Dr. Piper, for many years intimately associated with plant life in the Pacific Northwest, identified many of the bent grasses growing in this territory and on numerous occasions expressed the belief that some day it would become a large seed-producing section. He used his influence whenever possible to create interest in bent seed producing possibilities. His predictions have been fully substantiated, and already more bent grass seed is being produced in this territory than in all the remainder of the United States.



A small field of bent grass ready to be cut for seed. In the Lower Columbia River district

The history of bent grass seed production in the Pacific Northwest began in 1923 with the determination by Roland McKee, of the Bureau of Plant Industry, United States Department of Agriculture, and the writer, that the dense, low-growing, sod-forming grass growing in the Coos Bay, Oregon, region, and known locally as Bermuda grass, was in reality creeping bent. As a result of this determination the foundation for the present Pacific Coast bent grass seed industry was laid.

Upon Mr. McKee's return to Washington, D. C., this information was transmitted to Lyman Carrier, at that time in the office of forage crops, Bureau of Plant Industry, United States Department of Agriculture. Mr. Carrier was very much interested, and during the early spring of 1924 made a trip in company with the writer to the Coos Bay region for the purpose of investigation and ascertaining the possibilities of future bent grass seed production. He was very much surprised to find such large areas of practically pure stands of bent grass. A few months later, during that same year, Mr. Carrier became actively interested in harvesting and preparing for market the first bent grass seed grown on the Pacific coast. The harvesting of bent grass was begun two years later in the lower Columbia River section, and new areas are developing with each succeeding year.

From that comparatively small beginning the industry has developed very rapidly and the territory now producing bent grass seed

extends from southwestern Oregon to the Canadian line, mostly west of the Cascade Mountains. The largest bent grass seed producing areas are the Coquille Valley, the lower Columbia River districts in Oregon, and the Puget Sound district in Washington. Smaller producing areas are at Reedsport and Gardiner near the mouth of the Umpqua River, at Cushman near the mouth of the Siuslaw River, in the vicinity of Yoncalla, in the Willamette Valley, near Klamath Falls in Oregon, and in various sections of western Washington chiefly in the vicinity of Chehalis and Raymond.

Practically all of the stands now being harvested for seed are natural and many of these have been in existence for many years. The only entirely artificially seeded fields of bent grass now being harvested for seed are in Klamath County, Oregon. These seedings consist of approximately 70 acres and produced their first seed crops in 1930.

For the most part the land on which these bent grasses are growing is moist, of very low elevation and quite often subject to overflow, being in many cases under almost tide-water conditions. The regions of highest elevation now producing bent grass seed commercially are in the vicinity of Yoncalla and Klamath Falls, Oreg. The elevation at Yoncalla is approximately 356 feet and that at Klamath Falls approximately 4,105 feet.

No effort has been made to determine definitely the acreage on which bent grass is now actually growing and which offers potential seed-producing possibilities in the Pacific Northwest, but it is estimated that there is a total of 20,000 acres in Oregon and Washington on which bent grass seed may some day be harvested if the demand requires it.

There are a number of varieties of bent grass producing seed in commercial quantities in the Pacific Northwest. In the Coos Bay, Umpqua, and Siuslaw regions in Oregon practically all the seed harvested is seaside creeping bent, *Agrostis palustris* (*A. maritima*). The seed harvested in the lower Columbia River district is, for the most part, *Agrostis capillaris* var. *Astoriana*. In the Puget Sound, Wash., district there is considerable variation in varieties according to different areas. For the most part the seed harvested there is either *Agrostis palustris* or *Agrostis capillaris*. In the Yoncalla, Oreg., district the particular bent grass is another variety of *Agrostis capillaris*, locally known as Oregon bent. In the Klamath Falls district where the stands are now being harvested for seed the variety is *Agrostis capillaris* var. *Astoriana*. In the Willamette Valley there is considerable variation as to type and the predominating variety is common colonial bent, *Agrostis capillaris*.

Practically all of the natural stands in the Pacific Northwest contain some mixture. The Coos Bay and lower Columbia River sections are practically free from mixtures and are recognized as the purest stands of their particular varieties.

The harvesting of bent grass seed in the Pacific Northwest is a very interesting procedure. The crop is usually mature enough to harvest about July 20 and is ready to cut when heads rubbed rather briskly in the hand produce well-colored, plump, practically mature seed. Bent grass does not shatter easily under ordinary conditions. However, if it is cut too ripe or handled excessively after dry there may be some shattering.



The grass is cut with ordinary mowing machines and allowed to remain in the swath until dry enough to shock. Comparatively small shocks are usually made so that the material will dry out rapidly. Sometimes the crop is windrowed with a side-delivery rake and threshed from the windrow. As soon as dry enough to thresh it is hauled in tight-bottom racks to stationary threshing machines of the grain-threshing type and the seed is separated from the straw. About 30 acres were combined\* in 1930 by the windrow method. This was the first time bent grass has been harvested in the Pacific Northwest by this method.

In order to secure the maximum amount of seed the material to be threshed must be dry. When damp the seed is difficult to separate and a large amount is lost. It has been the practice in a few instances to rethresh straw stacks after they have stood for some time. In a few cases this has been quite profitable while in others the amount of seed secured did not pay expenses.



Threshing bent seed in Coos County, Oreg. Here a 3-machine threshing outfit is in operation in a field of about 160 acres

The mechanism of the threshing machine must be thoroughly understood and adjusted so that the machine will do good threshing work, save practically all of the seed, and allow as small amount of trash, leaves, and straw to get into the sack as possible. It is not advisable to thresh in such a way as to get only clean seed in the sack because this practically always means a large blow-over of good seed.

The hand-harvesting of heads with sickles or shears is another method of harvesting which has been practiced in some sections during the past two years. Threshing with an ordinary thresher follows. This method of harvesting is usually practiced where only small areas are available and where the contour of the land is such that machinery can not be satisfactorily used. It is also practiced in some cases to eliminate possible mixtures or where the material has to be transferred for considerable distances for threshing.

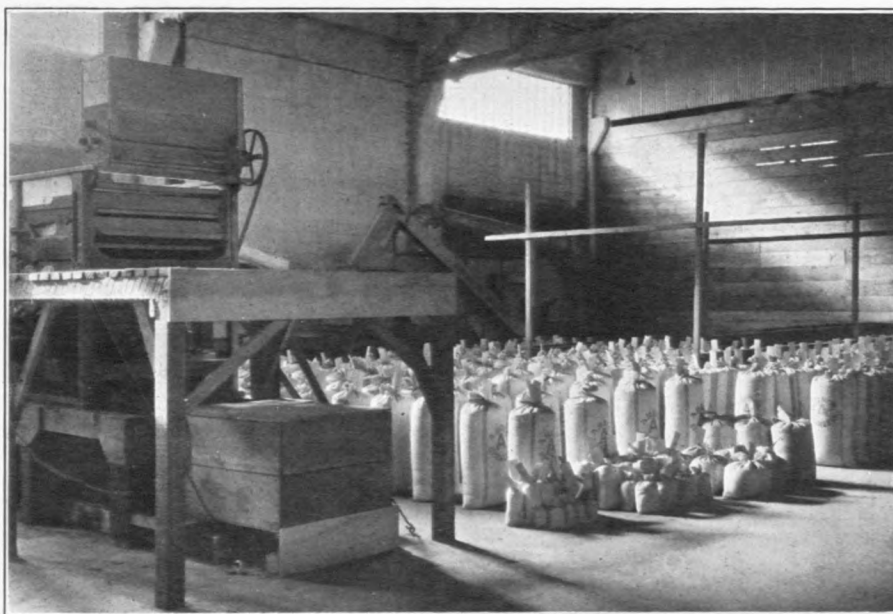
During the first few years of bent grass seed harvesting activity, the few persons interested in it purchased the bent grass hay from the growers after it had been cut at the seed maturity stage and shocked and dried ready for threshing. The hay purchaser did all the threshing, kept the seed, and returned the straw to the grower. For the privilege of threshing and retaining the seed the purchaser paid the grower from \$12 to \$20 a ton for the hay before threshing,

\* A combine is a machine which is capable of harvesting and threshing in a single operation. Harvesting by the windrow method however requires two operations; the first is the mowing and windrowing, and the second is the operation of picking the heads and straw from the windrow and threshing it.—EDITORS.

and the seller retained the straw. This straw is fed to live stock and is considered practically the equal of unthreshed bent-grass hay.

During recent years the number of individual bent grass seed harvesters and threshers has increased considerably and the purchasing of hay for threshing has decreased in proportion. It is probable that some growers have too heavy an investment in equipment for the acreage they handle.

Threshing is done in the field whenever possible. During seasons when the harvest may be late or weather conditions moist, the hay is sometimes stacked, usually under cover. Where this procedure is followed the threshing season is extended considerably, and during some seasons threshing in barns continues well into the winter. The efficiency of threshing machine operation determines to a very large extent the amount and quality of seed secured.



Bent seed warehouse in the Pacific Northwest, showing the cleaning machinery

Yields of seed vary considerably. The hay from some fields produces such a small amount of seed that quite often threshing is discontinued after the results are ascertained. On the other hand, some rare fields have been reported as producing as high as 300 pounds of seed an acre. Average seed yields from all fields in all bent grass seed producing sections of the Pacific Northwest is probably between 50 and 75 pounds an acre. The seed yields vary greatly with seasonal conditions. Late overflows on low lands have a tendency to increase vegetative growth very materially and quite often reduce seed production. Abnormally dry seasons on the higher lands may reduce seed yields considerably. Rainy harvest periods sometimes result in considerable crop loss. During some years insect injury is also prevalent and the production of seed is reduced to the point where harvesting may not be profitable. Cutworms are considered the worst insect enemy.

During the early days of bent grass seed production the cleaning of the seed was done in commercial warehouses for the most part. As the number of individual producers increased, farm-cleaning plants were built and operated by many growers.

The quality of the cleaned product, while to some extent gauged by the type of cleaner used, is for the most part determined by the operation and the operator of these machines. Very high-quality seed is being produced by all types of cleaners now in operation. Cleaning bent grass seed is a rather difficult operation and very slow. The material as it comes from the threshing machine usually contains a high percentage of chaff, leaves, stems, and other foreign material. In some sections and on some fields where foreign plant seed is produced quite heavily and threshed with the bent grass, considerable difficulty is experienced at times in making a separation of such foreign seed from the bent grass seed. It is practically always necessary to run the seed through the cleaner 4 to 6 times, and some goes through 14 or 15 times in order to get at least a portion of the product of the necessary quality for high market standards.

Inspection of bent grass seed fields in the Pacific Northwest began in Coos County, Oreg., in 1925. The first seed was certified in Astoria, Oreg., in 1926, by members of the Oregon State Agricultural College. It is optional with the grower and dealer as to whether or not the seed is certified. The majority of the seed produced in Oregon is now subject to certification. Seed to be of certified quality must come up to certain field and finished seed standards as established by the Oregon State Agricultural College. The certification methods and standards are as follows.

Upon application by the interested party, fields are visited and examined after they are completely headed out. The examination is an extended one and a careful check is made as to the presence of any other kinds of bent grass or redtop. Each lot of seed is required to be kept separate until after it has been finally inspected. When harvesting and cleaning are completed the inspector uses a compartment grain tryer for sampling each 100-pound or 50-pound bag of seed offered for certification; or in the event of bulk lots, numerous samples are taken with the tryer and if the lot passes it is sacked in the presence of the inspector. Examinations with the eye and a high-powered microscope are made to be sure that the seed is strictly of the origin claimed for it. All lots that are passed for certification are immediately sealed and tagged so that there is no possibility for adulteration previous to the sealing process. Each tag is numbered and a record is kept for each tag that is issued, the lot from which it came, and the weight of the bag.

Standards have been established based on experience in the handling of the seed. In general terms, the seed must be very free from other bent grasses or redtop and from other foreign seeds, and must not have so much inert matter or chaffy material as to make it light in weight or present a bad appearance. No fields are passed for certified bent if they contain more than  $\frac{1}{2}$  per cent of other kinds of bent grass, and the same standards apply to the threshed seed. While it is not possible to make exact analyses of all of the lots, no lot is passed if in the judgment of the inspector it contains more than 1 per cent of weed seeds. While a definite standard on weight per bushel has not been set, no lots have been passed weighing less than

30 pounds to the bushel, and practically all will test 34 or more pounds to the bushel. Every precaution is taken to assure the customer that he is getting a good grade of very pure, clean, live seed. Most of the seed has less than  $\frac{1}{4}$  of 1 per cent of foreign seed.

Bent grass seed certification work has been carried on to a small extent in the State of Washington. No concerted effort has been made, however, in that state, such as has been made in Oregon, and as yet a comparatively small amount of the seed in that state is placed upon the market as certified seed.

The marketing of Pacific Northwest grown bent grass seed of the various varieties is undergoing constantly increasing expansion. During the early years of seed production the marketing was for the most part done by Lyman Carrier, either directly from his warehouse or through various seed firms in different sections of the country. During the past four years, with the increased production, there has been an increased number of marketing agencies distributing either in wholesale or retail lots or in both. At present there are no growers' cooperative organizations marketing the bent grass seed.

The future outlook of the bent grass seed production business in the Pacific Northwest is encouraging. There is still considerable acreage of natural stands that can be harvested and probably will be as the market expands. The most accessible acreage is now being harvested. As the harvested acreage increases it will naturally result in the more inaccessible areas being harvested, and there will probably be more hand-harvesting done than heretofore if prices are maintained.

On the present price basis there are great possibilities for the production of bent grass under cultivation in Oregon and Washington. In many of the lower-lying sections along the Pacific coast large acreages can be prepared and seeded to the variety of bent grass adapted to the particular locality. Some of this work is now being done in the lower Columbia River district, and it is expected that the seed from the planted areas will be harvested in 1931. The Klamath Falls area in Klamath County, Oreg., represents large possibilities in this connection. Climatic and soil conditions there seem to be very well adapted to the production of bent grass seed. If the market demand warrants there will no doubt be an increased acreage seeded in the near future in that section.

There are several areas in western Washington that offer possibilities for seed production under cultivation. That the bent grass industry has expanded very rapidly and has already assumed major proportions is indicated by the increase in tonnage from approximately 5 tons in 1924 to 125 tons in 1930. The recent increase in tariff is expected to stimulate the production of bent grass seed in the Pacific Northwest territory. That whole territory, especially along the coastal area, is naturally adapted to the growth of various varieties of bent grass, and the indications are that as the market demands expand production will increase in proportion.

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The greenkeeper who gets the most done and still seems to have the most time on his hands for other things is the one who goes at his work methodically. Time used in mapping out your campaign in advance is time well spent.

## Canadian Certified Bent Seed

By G. LeLacheur

Dominion Seed Branch, New Brunswick

The bent seed industry in Prince Edward Island and New Brunswick had its origin in the decline of German mixed bent imports during the World War and in the insistent demand to supply the new golf courses which were rapidly established on the return of peace. Production was increased from 200 pounds in 1923 to 88,000 pounds in 1926, when prices to the growers dropped from 84 cents to 40 cents a pound for No. 1 quality seed. Only 28,000 pounds were harvested in 1927, but with the higher prices which have prevailed since that year the production has gradually increased to about 50,000 pounds in 1930.

The Prince Edward Island and New Brunswick Grass Seed Growers' associations are organized on a cooperative basis for central cleaning and marketing, and are not subsidized by Provincial or Dominion Governments. Field inspection of seed crops, sampling, testing, and sealing of seed in sacks are done by the Dominion Seed Branch on the basis of service at cost. Experiments have been conducted on production and cleaning problems.



Inspecting a field of creeping bent grass at Memramcook, New Brunswick, where over 2,000 acres of dyke land are available for multiplication of this grass.

Purity of variety is essential to the development of turf with uniformity in color and texture. The official Canadian standards are over 95 per cent for Prince Edward Island colonial bent and New Brunswick creeping bent, and 85 per cent for velvet bent seed. Inspection practice limits redtop as an impurity to 2 per cent, the remaining 3 per cent being other fine bents. The lower standard for velvet bent was adopted because Prince Edward Island colonial bent persists in old velvet bent meadows or is a volunteer growth in new seeding. Only the larger seed of the former named variety can be separated from velvet bent in cleaning.

Every field from which seed is harvested must pass a rigid inspection. The seed crop must show good vigor of growth, and must be relatively free from bad turf weeds, the seeds of which are difficult of separation. Bent seed of high germination which will produce strong seedlings can not be expected from a crop weakened by disease or soil poverty. Redtop was introduced into a few localities with United States grown timothy seed, and is avoided as a grass which produces a coarse, open turf. All the redtop seed can not be separated from the fine bents and can be distinguished from them by a seed expert only with the microscope. Fields which contain an appreciable quantity of common plantain or mouse-ear chickweed are disqualified.

Certified Canadian bent seed is cleaned to about 95 per cent pure seed with an average germination of 85 to 90 per cent. Weed seed impurities rarely exceed  $\frac{1}{5}$  of 1 per cent. The cleaning process is slow and tedious and varies with the condition of the farmer's lot which is shipped to the plant in the chaff. Big power machines with four screen decks are connected in series, and fine-mesh screens are used to run off coarse material and separate very fine weed seeds and soil dust.

Although our bents run about 6,000,000 seeds to the pound, they have remarkable longevity with proper methods of curing and storage. Several samples of well-ripened Prince Edward Island colonial bent from the 1924 crop still germinate from 80 to 88 per cent.

A good start has been made on the production of velvet bent on Prince Edward Island. Here it requires a moister and more fertile soil than does our colonial bent. "The Island" strain of velvet bent is of very fine quality and is being multiplied for commerce. As yet only a few hundred pounds of seed are available to the trade. Seed lots running below 85 per cent of velvet bent will be offered as a mixture, and the label will show the percentage content of each variety.

The New Brunswick strain of creeping bent is fine in texture, dark in color, and from results of tests already made in Canada and the United States it is felt that it will be suitable for putting greens and moist soils of fairways and lawns. The purity of variety can readily be noted in the illustration. About 4,000 pounds of seed are available from the 1929 and 1930 crops.

Seed yields run from 30 to 60 pounds of cleaned seed to the acre. Threshing, cleaning, advertising, shipping, and distribution costs are high. There is only a limited market in Canada, and the United States has increased the tariff on bent seed from 2 cents to 40 cents a pound. The demand for certified seed will increase in both countries with the development of a wider appreciation for fine turf, but growers will not harvest seed crops unless they feel assured of receiving profitable prices for the product. The Canadian crop might easily be increased to 500,000 pounds.

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Eighty-five thousand new kinds of plants have been brought into the United States from foreign countries since 1898, when the office of foreign plant introduction of the United States Department of Agriculture was established. Many of these introductions have been of extreme economic importance. It is estimated that the wealth of the country has been increased by millions of dollars in this manner. Golf courses themselves have profited from some of the new grasses introduced.

### QUESTIONS AND ANSWERS

All questions sent to the Green Section will be answered in a letter to the writer as promptly as possible. The more interesting of these questions, with concise answers, will appear in this column. If your experience leads you to disagree with any answer given in this column, it is your privilege and duty to write to the Green Section.

While most of the answers are of general application, please bear in mind that each recommendation is intended specifically for the locality designated at the end of the question.

**Cutting fairways when, under conditions of drought, portions of the turf, are withered.**—During hot, dry weather our fairway turf in places is brown, while in other places, especially those which lie low, it is green. There is quite a difference of opinion as to the advisability of cutting grass that is withered from the summer drought, and in cutting fairways of the condition described it is almost impossible to cut simply the green spots and leave the brown untouched. (Minnesota)

**ANSWER.**—Our advice is to cut the fairways regularly whenever there is sufficient growth anywhere on a fairway to justify cutting even though portions of a fairway may be withered. To discontinue cutting entirely under such conditions would result in the grass on the low areas growing altogether too high and becoming objectionable from a playing standpoint. The mowers on the fairway should however be set to cut as high as the players will permit. If the grass on an entire fairway is withered, of course regular cutting should be discontinued.

**Controlling clover in bent greens.**—At present (June) a large quantity of clover is appearing in our creeping bent greens, which are three years old. We have used a strong application of sulphate of ammonia to rid the greens of the clover, but this has seemed to give it more vitality. Would an application of arsenate of lead be more satisfactory? (Wisconsin)

**ANSWER.**—We have never had proof that arsenate of lead will control clover and do not believe it has any particular value for that purpose. Late spring and summer is not the best time of the year to do much with clover. However, with the advent of early fall and its better growing conditions clover can be markedly set back by dusting the patches with sulphate of ammonia early in the morning when the dew is on the turf. This will severely burn the clover. As soon as burning of the clover is apparent the green should be watered to prevent injury to the grass roots that may be in or around the clover patches that have been treated. Clover is frequently introduced into greens through top-dressing material. Manure usually contains clover seed. We would recommend that you set out some flats of your top-dressing material to see whether or not clover germinates in it, and if so to take steps to procure top-dressing material that proves to be free from viable clover seed.





**Genius is an infinite capacity for taking pains.**

**George Elliott**

