

Variety Specific Standards
(a term defined for, and used in this paper)
Review
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Introduction.

In the 2015 Grass & Legume Advisory Committee, there was presented a written request from Tee-2-Green Corp. requesting changes to the Creeping bentgrass Seed Standards; the request was in two parts: (1) Simplify the standard by eliminating two of the three sets of higher mechanical standards, and (2) to assign eight varieties to the remaining set of higher mechanical standards.

Discussion of the Tee-2-Green request raised the following:

- (1) These are company standards and should be handled in production contracts.
- (2) These don't address varietal differences.
- (3) These cause concern for the complexity of the program if this were to proliferate to other crop standards.

The following is intended to provide background for further discussion of Variety Specific Standards (VSS) - requirements specified for a variety and used in determining eligibility for Seed Certification.

Basic requirements.

Federal Seed Act Regulations set field and seed standards pertaining to field history, isolation, other varieties and off-type, and zero or restricted tolerance for Prohibited or Restricted weed seeds, respectively; the FSA Regulations do not address mechanical standards for Other Crop and Weed Seed (U.S. GPO, 2016).

The Association of Official Seed Certifying Agencies (AOSCA) Certification Handbook includes the following:

“This publication contains the Genetic and Crop Standards of the Association of Official Seed Certifying Agencies which are the requirements (rules, procedures, and standards) developed for certifying seed and other propagating materials. These are minimum requirements. No member agency may establish standards lower in any respect, but may establish higher standards. The primary purpose of seed certification is to maintain genetic purity and varietal identity. As an additional service, included in this publication are standards involving such factors as physical quality and disease. For agencies choosing to implement mechanical standards, the publication includes AOSCA minimums related to physical quality, minimum germination, and disease restrictions” (AOSCA, 2016a).

In the 1960's, there was discussion and a proposal within AOSCA to remove mechanical standards, but some east coast seedsmen, agricultural extension agents and seed control officials strongly opposed such a move. A compromise led to the optional provision contained

in the AOSCA, 2016a citation, above. Some seedsmen in Oregon also intended to capitalize on the advantages resulting from Oregon's climate to produce high quality seed and sought to reflect that advantage in the Oregon certification seed standards (Brewer, 2016).

Kinds of variety specific standards, this list probably is not exhaustive:

- **Seed may be offered for sale only as a class of Certified seed.** This is a specification determined by the originator of the variety and is published in the variety release document and in the application to enter the variety into Seed Certification.
- **Generations permitted.** These are specified by the originator of the variety at the time application is made to enter the variety into Seed Certification. A specification of generations permitted may subsequently be amended by written request from the originator of a variety.
- **Length of Stand (LOS).** This is specified for each permitted generation by the originator of the variety at the time application is made to enter the variety into Seed Certification. A specification of LOS may subsequently be amended by written request from the originator of a variety.
- **No certified harvest during the seedling year.** This may be specified by the originator of the variety at the time application is made to enter the variety into Seed Certification, and may be amended in writing by the originator.
- **Certified seed production may have geographic restrictions.** This may be specified by the originator of the variety in the variety release document and at the time application is made to enter the variety into Seed Certification, and may be amended in writing by the originator. Example: Kenstar Red clover; "West of 98° longitude, foundation and certified seed must be produced above 40° latitude" (Taylor, 1973)
- **Variety Fluorescence Level (VFL).** May be specified by the originator of the variety and may be amended in writing by the originator (AOSCA, 2016b)
- **Variant,** naturally occurring and distinct within a variety and described by the breeder (AOSCA, 2016c). These may be phenotypic variants, e.g. taller types, or seed variants, e.g. red kernels in white wheat.
- **Erucic acid and glucosinolate content** must be determined and be described by the plant breeder for each variety (OSCS, 2016a).
- **Additional Certification Requirements,** testing required to confirm the presence of non-visual traits (AOSCA, 2016d)
- **Grower affidavit of an agronomic practice** (OSCS, 2016b)
- **Quality Standard: Pure Seed**
- **Mechanical Standards: Other Crop, Weed Seed and Viability**

Examples of existing variety specific standards:

- ❖ Seed of Critana Thickpsike wheatgrass may contain up to 30% Slender wheatgrass (AOSCA, 2016e).
- ❖ Astoria (a public variety) Colonial bentgrass was permitted 4% Inert while the crop standard was 2%¹, and Exeter Colonial has a stricter Other Crop standard than the Colonial blue-tag standard OSCS, 2016c).
- ❖ Reubens and Supranova Bluegrass were allowed a greater Inert tolerance (OSCS, 2016d).
- ❖ America and Merion Kentucky bluegrass were allowed a greater inert tolerance (OSCS, 2016e).
- ❖ Kentucky bluegrass tolerance in Colt, Laser, Laser II, and Sabre Rough bluegrass (OSCS, 2016f)
- ❖ Astor, Bison, Polly, and Tetrelite Intermediate ryegrass varieties require stricter Pure seed tolerance (OSCS, 2016g).
- ❖ Perennial ryegrass varieties are specified as either meeting 99% total ryegrass or 97%. Within the former, Linn Perennial may have 85% minimum germination, rather than 90%. Within the set of varieties requiring 97% total ryegrass, a variety may require either 90% or 85% min. germ (OSCS, 2016h).

Evolution of Creeping bentgrass standards in Oregon:

The first grass to complete the seed certification procedure in Oregon (field inspection, seed examination, bagging, sealing and tagging) was Astoria Colonial bentgrass in **1926**; Seaside Creeping bentgrass was certified in **1927**. Field standards permitted 0.5% other kinds of bentgrass; seed standards limited weed seed to no more than 1.0% (Hyslop, 1930). Dr. Hyslop (Head, Farm Crops Department, Oregon Agricultural College) stated:

“The Oregon grown seed containing even one per cent of weed seeds is so much better than much 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 as blue-tag seed.” Also, “The standards that have been adopted..... were considered to be very rigid.....and some 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.”

For **1931**, Dr. Hyslop planned a higher grade of seed with no more than 0.25% weed seed.

“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.

“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

¹ For the most part, Astoria bentgrass was grown on peat soils around Clatskanie; these fields could not be burned, Ergot was prevalent and the percent inert was higher (Brewer, 1999 and Brewer, 2005).

we hope to maintain a continued profitable market for the Oregon bent grass seeds” (Hyslop, 1930).²

The **1936** “Rules for Bent Grass Seed Certification in Oregon” pertained to Astoria bent, Seaside bent, Highland bent and Rhode Island bent (Hyslop, G.R., E.R. Jackman and H.E. Finnell, 1936) – one set of standards for all species of bentgrass.

1947 Bentgrass Seed Certification Standards applied to all bentgrass species, and specifically Astoria bent, Seaside bent, Highland bent, Rhode Island or Colonial bent, and Velvet bent (Finnell, H.E., E.C. Johnson, and G.W. Dewey, 1947)

Penncross Creeping bentgrass was released in **1955** and standards specific to Penncross were prepared for **1956** (Finnell, H.E., G.W. Dewey and G.W. Clark, 1956). In that year, the program continued with the Bentgrass standards that had been in place since the 1930’s plus those for Penncross. Separate standards appear to have been prepared for Penncross to specify the repeated three-row pattern planted with Foundation class stolons; Penncross seed was a first generation cross from random cross of the three clones (Hein, 1958)

By **1965**, the Bentgrass standards had been split, with Highland, Holfier and Exeter Colonial being in one set of standards, and Astoria Colonial and Seaside Creeping in a separate set. Within the latter, Astoria and Seaside had separate sets of seed standards (Brewer, D.H., W.E. Sieveking, and H. Youngberg, 1965).

For the first time, the **1966** Oregon Certified Seed (handbook) included a separate set of standards for the Creeping bentgrass; Seaside was named at the top of the seed standards, the Other Crop, max. and Weed Seed, max. were the same as proposed by Dr. Hyslop for the 1931 crop (OSCS, 1966). From 1966 to the present, Colonial Bentgrass standards have included separate columns of seed standards, first for Astoria, and subsequently for Astoria and Exeter (OSCS, 2016c).

In **1973**, the variety Emerald was added to the Creeping bentgrass standards (OSCS, 1973); for the previous 46 years, Seaside had been the only Creeping bentgrass variety certified in Oregon. In **1974**, at the variety originator’s request, a separate set of standards were established for Emerald that permitted more Other Crop: 1.0% compared to 0.5% (OSCS, 1974).

By **1980**, five Creeping bentgrass varieties had been entered into Oregon Seed Certification (Seaside, Emerald, Prominent, Carmen, and Penneagle); the Creeping bentgrass standards included three sets of Certified class standards, one for the crop, one for the variety Emerald, and one for the variety Penneagle. The standards for Penneagle were stricter for Weed Seed than was the crop standard, 0.10% compared to 0.25%, and added a Group B Weed Seeds (OSCS, 1980).

² At this same time, Canadian standards for colonial and creeping bent were “about 95 per cent pure seed.....and weed seed impurities rarely exceed 1/5 of 1 per cent”(LeLacheur, 1930).

In **1987**, the Creeping bentgrass standards added an additional set of standards specific to the variety Pennlinks and more strict than the crop standards with regard to Other Crop and Weed Seed, and also included the Group B Weed Seeds. Four companies had varieties entered (OSCS, 1987).

For the **1998** Creeping bentgrass standards, the set of mechanical standards specific to Emerald were dropped, and a set specific to the varieties A-1, A-2, A-4, G-1, G-2, and G-6 were added. This latter set of mechanical standards were stricter than the crop standard: Other Crop, 0.04% compared to 0.50%, Weed Seed, 0.03% compared to 0.25%, and no Annual bluegrass nor Rough bluegrass seed were allowed. Thirty-two varieties had been entered for certification (OSCS, 1998).

For **2006**, Penneagle II and PennLinks II were added to existing standards specific to Penneagle and Pennlinks, respectively.

A review of Minutes from the Grass & Legume Advisory Committee and from the Board reveals that each time the Creeping bentgrass standards were changed, the proposal went before both groups for a vote. However, when the standards were not changed, but only additions of variety names were made to sets of existing variety specific standards, then this has been handled administratively within the Seed Certification office. This administrative action was consistent with the same taken when a perennial ryegrass variety originator would request in writing, a re-assignment of their variety to a different purity or viability standard.

The **2015** Grass & Legume Advisory Committee tabled a request from Tee-2-Green to (a) remove two sets of variety specific mechanical standards, and (b) to re-assign specific varieties to the remaining set of variety specific mechanical standards. The accompanying discussion addressed the topics listed in the Introduction of this Review (Grass and Legume Advisory Committee, 2015). These same topics, or ones similarly expressed, occurred in previous Grass & Legume Committee meetings when proposals for variety specific mechanical standards were before the committee. The following is from the December 10, 1997 Minutes of the Grass & Legume Advisory Committee: “Members of the Committee were hopeful that a variety-specific, rather than crop-specific, approach to the standards would not become the norm, especially since these concerns can be handled contractually. There was no objection to establishing more stringent standards when requested” (Grass and Legume Advisory Committee, 1997).

Bentgrasses for Golf Courses

Regarding the bentgrass seed industry in eastern Canada, LeLacheur (1930) wrote it “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.” It was at this time that seeded bentgrass varieties from Oregon (Astoria, Highland, and Seaside) began to be marketed for golf course use (Schoth, 1930). Rogers (1991) noted the problem that “seeded creeping bentgrasses in the past tended to segregate, developing patches of distinct grasses in golf greens. Not only did this look bad, but it affected maintenance and playability.”

Rogers went on to say Penncross creeping bentgrass “significantly reduces this problem, and has been the standard since its introduction in 1954. Warnke (2003) wrote regarding the segregating patches of creeping bentgrass, citing Dr. Duich (1985), Professor of Turfgrass Science at Pennsylvania State University, that from the better appearing patches “many hundreds of clones were eventually selected and maintained vegetatively by the United States Golf Association Green Section at the Arlington Turf Gardens in Arlington, VA. Seaside was much inferior in turf quality to the vegetatively propagatedbentgrasses. Therefore, putting greens in the United States were primarily established vegetatively until the 1950s.”

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Variety Specific Standards

Personal observations – Barry Schrumph

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There are many kinds of variety specific standards. Some are based on varietal differences (genetic), some are established for business reasons. Seed Certification policies, procedures and standards accommodate both genetic and business reasons. Throughout AOSCA and state certifying agency's policies, programs, and standards there are provisions designed to meet the needs that pertain to plant breeding, variety development, seed production, seed marketing, etc.; variety specific standards in its many forms are just one example. Others include Early sampling, use of name synonyms, tagging based on a TZ, distributed tag printing; there are many, many kinds of provisions developed and designed to serve the needs of the industry.

Though not required by the Federal Seed Act, most states have mechanical standards. From the earliest years of seed certification, mechanical standards have been adopted to gain recognition and advantage in the market place, and most definitely to be competitive.

The problems of turf quality inherent in the early seeded varieties of creeping bentgrass (e.g., Seaside), the tendency for segregating patches to develop in the turf, the hand weeding noted by Dr. Hyslop were all reduced by turning to clones for vegetatively establishing the putting greens. A return to use of seeded clones, or the three clone cross to produce Penncross, reintroduced the problem of weed seeds, and the task of controlling weeds on the greens. This resulted in pressure from consumers to have seed that met very high mechanical purity standards, and they wished to see those standards published in Seed Certification standards.

Consumers of seed products have strongly encouraged, if not demanded that mechanical standards be a part of seed certification standards. These standards are published and readily available to those who wish to reference them; publication and public access to Seed Certification standards is a salient reason for including mechanical standards in that it allows consumers to know the minimum quality they can expect when purchasing seed. Therefore, the purpose of mechanical tolerances in the standards goes beyond control over local production, but extends to advertisement and competition in the market place. An analysis tag accurately shows what was found in the seed sample, but does not indicate how those results compare to an established and published norm, such as a certification standard, the Oregon seed certification tag in conjunction with the published standards, accomplishes this.

Though the concern has been voiced multiple times over the years, that variety specific mechanical standards might proliferate among many crop standards, and thus become unmanageable, that has not occurred. The proliferation that has occurred, did so early on in the years of standards development (bentgrass and bluegrass), but has continued primarily in the Creeping Bentgrass and Perennial ryegrass standards. I don't think that the situation will become unmanageable for at least two reasons, one is that over the more than 40 years of adopting variety specific mechanical standards, proliferation to other crops has been minimal, especially considering the number of other crops we certify in Oregon and therefore the

potential for proliferation, and secondly, Seed Certification is accustomed to addressing and managing details.

Seed Certification is all about details – their management and application. Seed Certification is prepared to handle details and does so throughout the process of confirming seed source, inspecting fields, seed testing, and determining final eligibility for tagging. Multiple levels of detail are what we do, and managing variety specific standards is built into the program.

Variety specific standards have been a part of the Oregon bentgrass standards since at least 1965 when 4% Inert was allowed for Astoria (a public variety) when all other bentgrass species were held to 2% Inert, max. This was not done for genetic reasons, but rather for agronomic reasons (could not field burn on peat soils). The first request for a variety specific mechanical standard for a private variety (Emerald) came in 1974, and that request was to lower the standard for Other Crop. The first request from Tee-2-Green for higher variety specific mechanical standards in the Creeping Bentgrass Standards came in 1980. The precedent for variety specific mechanical standards was established long before Tee-2-Green made its first request.

The 2015 request from Tee-2-Green greatly simplified the Creeping bentgrass standards, reducing the sets of Certified class standards from four to two, which should ease concerns over the complexity of the Creeping bentgrass standards and their accurate application.

The markets for Creeping bentgrass standards appears to include extremes for seed quality and seed price. One set of standards does not well serve this particular part of the seed industry, and in particular, that part of the industry involved with establishing golf course putting greens. In this circumstance, why should one set of minimum quality standards be forced to suffice? Why should there not be alternative sets of mechanical standards?

Although the request for an alternative set of standards may be submitted by a single company, once those standards have been accepted by the Certification Board, those standards are certification standards and may be used by any company for their varieties.

Use of variety specific mechanical standards, and other standards that are not always based on varietal genetic differences have long had a place in both the national and state certification programs. Companies and breeding programs incorporate these provisions into business plans. Removal of these standard provisions could be quite disruptive to existing business plans.

Regarding creeping bentgrass, from 1927 to 1954, certification was more about seed quality than genetic quality. Throughout this time, Seaside was the only creeping bentgrass variety being harvested in, and marketed from Oregon. It seems logical that the standards were perceived as variety specific, and that when new varieties came along that they should be able to have their specific standards also.

Competition is a major part of the plant breeding and seed industry, and competition has been built into some aspects of seed certification standards.

Throughout the history of seed certification efforts, there has been constant effort to include provisions that serve the needs of the seed industry.

The first Creeping bent variety specific standard (for Emerald) was a reduction in the Other Crop tolerance compared to the crop standard, subsequent variety specific standards were increases above the crop standards, eventually specifying severe restrictions compared to the crop standard. Doesn't this illustrate the great diversity for needs within one crop type? Why should seed certification standards be known as always addressing only the lowest quality accepted in the market place? Why should there not be opportunity for alternative sets of standards within one crop type?

Eliminating variety names from standards is not the same as removing variety specific standards; an alternative set of mechanical standards could be generically named, and the varieties assigned to it could be listed elsewhere. Right now, including the variety names with the alternative standards is the most effective way for all who need the information to have the information.

Eliminating variety specific standards of a specific type, e.g. some specific mechanical standards, should not be done in one crop type, without doing it in all crop types in which the particular variety specific standard occurs. It would also be important to very carefully and specifically define the specific type of variety specific standard that is to be eliminated, so as not to incur unintended consequences.

Eliminating "company standards" from seed certification standards may sound straight forward because the term implies a standard that does not reflect a true varietal difference (genetic difference). However, study of all the kinds of variety specific standards and how they are used, results in recognizing that some reflect a company's intent, and judging intent becomes problematic. For example, an initial variety acceptance application will specify the permitted generations for a variety and length of stand at each generation; these specifications are generally accepted as reflecting the genetic stability of the variety. There are plenty of examples of the variety originator, some years later, amending the initial specifications to allow an additional generation, and/or increased length of stand. Often these amendments are made, not so much for genetic considerations, as to meet the needs of production and inventory. Should these amendments be questioned and perhaps disallowed if judged to be for non-genetic reasons?

Evidently there have been circumstances that warranted alternative sets of Certified class mechanical standards; use of seed for establishing putting greens serves to illustrate one extreme in the great diversity of seed uses and has warranted a set of standards that were commensurate with the high level of quality needed for this application. Therefore, it might be well to consider a guideline or policy for alternative sets of standards. The request made by

Tee-2-Green in 2015 could serve as a model. Compared to the crop standard, they requested: Other Crop, max. 0.04% vs. 0.5% max. and Weed Seed, max. 0.03% vs. 0.25% max.; the requested standards were 12.5 times stricter for Other Crop and 8.3 times stricter for Weed Seed. And, Tee-2-Green requested zero tolerance for additional specified weed seeds. A guideline or policy for establishing an alternative set of standards could require that standards for Other Crop and Weed Seeds be stricter than the Certified class crop standards by factors of X and Y, perhaps 8 times and 6 times, and that zero tolerance be applied to additional hard to separate seeds. If viability is addressed in an alternative standard, then perhaps the suggested standard should be at least 5 percentage points different from the crop standard. Such a policy/guideline would avoid creating frivolous sets of variety specific standards, should they ever be contemplated. Perhaps this should be called a policy or guideline, rather than a general standard, because in setting any minimal requirements for an alternative set of variety specific standards, it is difficult to anticipate all the circumstances that could arise with another crop type.