2016 AOSA Rules Change Proposal 1

Purpose of Proposal: To eliminate the use of the Multiple Unit Procedure (factoring procedure) to determine the amount of inert matter attached to multiple seed units in fine fescues (*Festuca* spp.) as described in the AOSA Rules, Vol. 1, sec. 3.7.

Present Rule and Proposed Rule: (changes indicated in red text)

Table 3B. Volume 1. Factors to apply to multiple units[a]

Percent of single units of each species	~~Hard fescue[c]~~	~~Sheep fescue[c]~~	~~Chewings fescue~~	~~Red & Creeping red fescue~~	Crested wheatgrass[b]	Pubescent wheatgrass	Intermediate wheatgrass	Tall wheatgrass[c]	Western wheatgrass[c]	Smooth brome
50 or below	~~–~~	~~–~~	~~0.91~~	~~0.80~~	0.70	0.66	0.72	-	-	0.72
50.01-55.00	~~–~~	~~–~~	~~0.91~~	~~0.81~~	0.72	0.67	0.74	-	-	0.74
55.01-60.00	~~–~~	~~–~~	~~0.91~~	~~0.82~~	0.73	0.67	0.75	-	-	0.75
60.01-65.00	~~–~~	~~–~~	~~0.91~~	~~0.83~~	0.74	0.67	0.76	-	-	0.76
65.01-70.00	~~–~~	~~–~~	~~0.91~~	~~0.84~~	0.75	0.68	0.77	-	0.60	0.78
70.01-75.00	~~–~~	~~–~~	~~0.91~~	~~0.86~~	0.76	0.68	0.78	-	0.66	0.79
75.01-80.00	~~–~~	~~–~~	~~0.91~~	~~0.87~~	0.77	0.69	0.79	0.50	0.67	0.81
80.01-85.00	~~–~~	~~–~~	~~0.91~~	~~0.88~~	0.78	0.69	0.80	0.55	0.68	0.82
85.01-90.00	~~–~~	~~–~~	~~0.91~~	~~0.89~~	0.79	0.69	0.81	0.65	0.70	0.83
90.01-100.0	~~0.86~~	~~0.82~~	~~0.91~~	~~0.90~~	0.79	0.70	0.82	0.70	0.74	0.85

a The factors represent the portion of the multiple unit weights considered pure seed.
b Includes both *Agropyron cristatum* and *A. desertorum*.
c Dashes in table indicate that no factors are available at the levels shown. For evaluation refer to AOSA News Letter 60(1):10 (February 1986).

~~***Example:***~~
~~For a single species *(Festuca rubra* creeping red fescue)~~
~~(1) Purity Analysis Results:~~

~~COMPONENTS~~		~~WEIGHT (g)~~
~~Single Units~~	~~=~~	~~2.904~~
~~Multiple Units~~	~~=~~	~~0.168~~
~~Other Crop~~	~~=~~	~~0.007~~
~~Inert Matter~~	~~=~~	~~0.003~~
~~Weed Seed~~	~~=~~	~~0.002~~
~~**Total**~~	~~=~~	~~3.084~~

~~(2) Determine percent of Single Units:~~
~~(a)~~ ~~(b) 2.904 ÷ 3.072 × 100 = 94.53%~~

~~Single Units~~	~~=~~	~~2.904~~
~~+ Multiple Units~~	~~=~~	~~0.168~~
~~**Total**~~		~~3.072~~

~~(3) Factor from table for creeping red fescue with 94.53% Single Units = 0.90~~

~~(4) Portion of Multiple Units weight (grams) considered Pure Seed: 0.168 × 0.90 = 0.151~~

(5) Total weight (grams) of Pure Seed:

Single Units	=	2.904
+ Amount from (4)	=	0.151
Total		3.055

(6) Portion of Multiple Units weight (grams) considered Inert Matter:
(7) Total weight (grams) of Inert Matter:

Amount from (1)	=	0.003
+ Amount from (6)	=	0.017
Total		0.020

(8) Purity Analysis Percentages:

		WEIGHT (g)		**PERCENTAGES**
Pure Seed from (5)	=	3.055	=	99.06
Other Crop from (1)	=	0.007	=	0.23
Inert Matter from (7)	=	0.020	=	0.65
Weed Seed from (1)	=	0.002	=	0.06
Total		3.084		100.00

Example: For a single species (*Agropyron desertorum* — crested wheatgrass)

(1) Purity Analysis Results:

COMPONENTS	WEIGHT (g)
Single Units =	4.556
Multiple Units =	0.450
Other Crop =	0.035
Inert Matter =	0.105
Weed Seed =	0.008
Total =	5.154

(2) Determine percent of Single Units:

(a) Single Units =	4.556	
+ Multiple Units =	0.450	
Total	5.006	

(b) 4.556 ÷ 5.006 × 100 = 91.01%

(3) Factor from table for crested wheatgrass with 91.01% Single Units = 0.79

(4) Portion of Multiple Units weight (grams) considered Pure Seed: 0.450 × 0.79 = 0.356

(5) Total weight (grams) of Pure Seed:

Single Units	=	4.556
+ Amount from (4)	=	0.356
Total		4.912

(6) Portion of Multiple Units weight (grams) considered Inert Matter:

Multiple Units	=	0.450
- Amount from (4)	=	0.356
Total		0.094

(7) Total weight (grams) of Inert Matter:

Amount from (1)	=	0.105
+ Amount from (6)	=	0.094
Total		0.199

(8) Purity Analysis Percentages:

	Weight		Percentages
Pure Seed from (5) =	4.912	=	95.30
Other Crop from (1) =	0.035	=	0.68
Inert Matter from (7) =	0.199	=	3.86
Weed Seed from (1) =	0.008	=	0.16
Total	5.154	=	100.00

Note: The same steps are followed if one or more of the species in the table occur in a mixture. If germination on the sample is requested, the Multiple Units and Single Units of the same kind are recombined following the purity analysis computation.

Proposed wording for the AOSA Rules for Testing Seeds Vol. 1

Table 3A. Pure seed unit definitions

PSU Number	Description of Pure Seed Unit
22	Multiple floret spikelet, multiple floret, or floret, with or without pedicel, with or without awn(s), provided there is a caryopsis at least one-third the length of the palea measured from the base of the rachilla. Caryopsis or piece of broken caryopsis larger than one-half of the original size. The amount of inert matter attached to the multiple units shall be determined by the method described in section 3.7. Special consideration: * When coated seed units are de-coated for purity analysis the method in section 3.7 shall not be used. Separation of multiple units shall be as follows: - A fertile floret attached to another fertile floret shall be separated. - Attached glumes and empty florets extending to or beyond the tip of the fertile floret shall be removed and classified as inert matter. * In case of *Festuca ovina*, *F. rubra* subsp. *fallax*, *F. rubra* subsp. *rubra*, and *F. trachyphylla*: 1. The multiple unit procedure shall not be applied. 2. Upon request, the percentage by weight of multiple seed units found in a sample can be reported under other determinations on the certificate of analysis.

Harmonization and Impact Statement

- This rule proposal will harmonize AOSA fine fescues (FF) purity testing with the ISTA Rules with respect to multiple seed units. In ISTA Rules, the multiple seed units that contain at least one fertile floret are considered pure seeds and no factoring procedure is required. Upon customer request, the ISTA Rules provide the percentage by weight of multiple seed units and report it under "other determinations" on the certificate of analysis and the AOSA Rules would do the same under this proposed rule.
- The Canadian M&P and FSA regulations use factoring procedure.
- Studies have shown that multiple seed units that contain at least one fertile floret, as found in hard fescue, sheep fescue, chewing fescue and red creeping fescue have planting value similar to single seed units and contribute to the germination of samples (Appendix 1). Thus, they should be considered pure seed units.

- The proposed rule will contribute to efficiency of fine fescues purity testing. Saving time in purity testing will contribute to delivering timely results to the customers, and will help laboratories to control the cost of testing.

Supporting Evidence

The purpose of seed testing is to determine the planting value of a seed sample. A seed unit (single or multiple) that contains at least one fertile floret has planting value. Furthermore, studies showed that multiple seed units of fine fescue containing fertile florets have similar capacity to germinate as single seed units (Appendix 1). The AOSA Rules acknowledge this fact, as they already require adding all multiple seed units back to the pure seed portion of fine fescues before conducting germination tests. It is worthy to note that in the cases of orchardgrass (OG) and Kentucky bluegrass (KBG), the AOSA Rules do not require separating multiple seed units or applying factor to estimate the percentage of inert matter attached to the seed units. Therefore, eliminating the FF multiple unit procedure will make OG, KBG and FF treated the same in this regard.

Eliminating the multiple unit procedure contributes to an increase of approximately 0.5% in pure seed results compared to applying the procedure (Appendix 1). The level of consistency in test results across laboratories for hard fescue, sheep fescue, chewing fescue and creeping red fescue were similar whether or not the factoring procedure is applied. Given the fact the AOSA Rules already require mixing the multiple and single seed units to constitute the pure seed portion for germination testing, the AOSA Rules, in essence, already recognize multiples as pure seed units for germination purposes. Thus, whole multiple units should be considered as pure seed units in both purity and germination testing (Appendix 1) and not as part pure seed and part inert matter in the case of the purity analysis.

Reducing the pure seed fraction via estimating the inert matter fraction following the AOSA multiple unit procedure creates differences in results when testing for international markets using ISTA Rules. Therefore, the purity of fine fescue produced in the USA can be perceived as lower quality in the global market, creating a disadvantage for US growers.

The elimination of the multiple unit procedure increases the objectivity of the test by eliminating potential human errors in identifying, separating, and calculating the portion of pure seed and inert matter in multiple units. The proposal simplifies the testing of fine fescues because pure seed used for purity and germination tests would be exactly the same. In addition, it would increase efficiency by saving over 40% of the time needed to complete a purity test in fine fescues (Appendix 1). For more specific data or questions, please see the supporting evidence presented in Appendix 1 and/or contact the authors.

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