Rule Change Proposal - 10

Purpose: To clarify when the multiple unit procedure may not be used for species in Table 3B and what factor to use in the event of a mixture of indistinguishable kinds.

Present and proposed rule:

3.7 Multiple unit procedures

a. **Use of the multiple units procedures:** The following methods shall be used only for the species included in ~~the following table~~ Table 3B when multiple units are present in a sample. These methods are applicable to the ~~species~~ kinds listed when they are the single kind of seed under consideration or they occur in mixtures of kinds ~~or singly~~.

b. **Definition:** A multiple unit is a seed unit that includes one or more structures as follows:

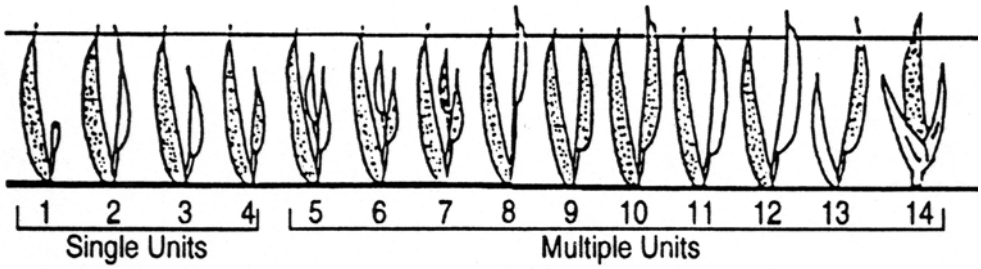
(1) An attached sterile or fertile floret that extends to or beyond the tip of a fertile floret (structures 8-12);

(2) A fertile floret with basally attached glume, glumes, or basally attached sterile floret of any length (structures 13-14);

(3) A fertile floret with two or more attached sterile and/or fertile florets of any length (structures 5-7).

The length of an awn shall be disregarded when determining the length of a fertile floret or an attached structure. Any seed unit without attached structures, as described above, shall be considered a single unit (structures 1-4). Multiple units and single units for the ~~species~~ kinds listed shall remain intact. The attached glumes and fertile or sterile florets shall not be removed from the fertile floret (see sec. 3.7.d (1) and (2) for exceptions).

The stippled (dotted) portion represents fertile florets and the clear portion represents sterile florets or glumes.



c. **Procedures for ~~determining~~ calculating the quantity of inert matter in multiple units:**

(1) **For a single species:** ~~Determine the percentage of single units present, based on the total weight of single units and multiple units. Apply the appropriate factor, as determined from the following Table 3B, to the weight of the multiple units and add that portion of the multiple unit weight to the weight of the single units. The remaining multiple unit weight shall be added to the weight of the inert matter.~~ Separate single and multiple units and determine the percentage of single units found based on the total weight of single units and multiple units (i.e., do not use the weight of the entire working sample). Multiply appropriate factor (see Table 3B) and weight of the multiple units, then add this product to the weight of the single units (pure seed). Subtract the product from the multiple unit weight, the difference shall be added to the weight of the inert matter.

(2) **For mixtures that include one or more of the ~~species~~ kinds in ~~the following table~~ Table 3B~~,~~:** For the kinds in Table 3B, determine the percentage of single units, based on the total weight of single units and multiple units, for each ~~species~~ kind. Apply the appropriate factor ~~as determined from the following table, to the weight of multiple units of each species~~ and calculate the percentage of pure seed and inert matter as described in 3.7.c (1).

d. Exceptions to the multiple unit procedures:

(1) In cases where no factor is available (i.e., dash in column for related percentage of single units) seed units shall consist of single florets and caryopses. All attached multiple units shall be manually separated into single florets, all sterile material (sterile florets, glumes) shall be removed and classified as inert matter. Attached fertile florets shall be separated into single florets. For further information refer to AOSA News Letter 60(1):10.

(2) In cases where two or more kinds listed in Table 3B are combined in a seed mixture and are considered indistinguishable, the largest factor in the table shall be used to estimate the quantity of pure seed and inert matter of the two kinds combined. If no factor is available for one or more of the indistinguishable kinds in the mixture the procedure described in 3.7.d (1) shall be used.

Table 3B. 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	Orchardgrass	Crested Wheatgrass[b]	Pubescent wheatgrass	Intermediate Wheatgrass	Tall Wheatgrass[c]	Western Wheatgrass[c]	Smooth Brome
	%										
50 or below	—	—	0.91	0.80	0.80	0.70	0.66	0.72	—	—	0.72
50.01-55.00	—	—	0.91	0.81	0.81	0.72	0.67	0.74	—	—	0.74
55.01-60.00	—	—	0.91	0.82	0.81	0.73	0.67	0.75	—	—	0.75
60.01-65.00	—	—	0.91	0.83	0.82	0.74	0.67	0.76	—	—	0.76
65.01-70.00	—	—	0.91	0.84	0.82	0.75	0.68	0.77	—	0.60	0.78
70.01-75.00	—	—	0.91	0.86	0.82	0.76	0.68	0.78	—	0.66	0.79
75.01-80.00	—	—	0.91	0.87	0.83	0.77	0.69	0.79	0.50	0.67	0.81
80.01-85.00	—	—	0.91	0.88	0.83	0.78	0.69	0.80	0.55	0.68	0.82
85.01-90.00	—	—	0.91	0.89	0.83	0.79	0.69	0.81	0.65	0.70	0.83
90.01-100.00	0.86	0.82	0.91	0.90	0.84	0.79	0.70	0.82	0.70	0.74	0.85

[a] The factors represent the ~~percentages~~ portion of the multiple unit weights ~~that are~~ considered pure seed. ~~The remaining percentage is regarded as inert matter.~~

[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)

	Single Units	=	2.904
+	Multiple Units	=	0.168
	Total		3.072

(b) 2.904 ÷ 3.072 × 100 = 94.53%

(3) Factor from table for creeping red fescue with 94.53% Single Units = ~~90%~~0.90

(4) Portion of Multiple Units weight (grams) considered Pure Seed: 0.168 × ~~90%~~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:

	Multiple Units	=	0.168
-	Amount from (4)	=	0.151
	Total		0.017

(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

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.

Supporting evidence: The current description of the multiple unit procedure is not clearly written. A clarification for this section was published in the AOSA News Letter (Hurst, 1986); however, the only reference to this information appears as a footnote to Table 3B. This proposal incorporates information from the article into the description of the procedure. In addition, instructions are proposed for instances where two or more kinds in a seed mixture may be declared indistinguishable.

Note: This proposal is not a change in the general use of the factor method, but simply a way to address the issue of analysis of mixtures containing two indistinguishable kinds that have different factors.

Harmonization and impact statement: Harmonization and impact of this proposal concerns two issues, (1) clarification of how to utilize the multiple unit factors and how these factors compare with other sets of testing procedures, and (2) how to apply multiple factors to mixtures of indistinguishable kinds listed in Table 3B.

To address the first issue a comparison for the Federal Seed Act Regulations (FSA) and the CFIA Methods & Procedures (CFIA M&P) is offered. The FSA utilizes the same

multiple unit factors as the AOSA Rules except that no factors are included for hard and sheep fescues. Since these two sets of testing procedures are essentially the same the clarification of how to use the information in Table 3A (compare to the FSA sec. 201.51a(b)) can also be applied when using the FSA. The CFIA M&P only apply a multiple factor to *Dactylis glomerata*. This factor is not the same as the range of factors used by the AOSA Rules for this species; therefore, changes to the current AOSA Rules with regard to the multiple unit procedure is of no consequence.

As for the second issue, although not stated in the AOSA Rules, it is well known from the literature (Musil, 1963; AOSA, 2008) and among seed analysts that absolute separation of the combinations of intermediate and pubescent wheatgrasses, hard and sheep fescues, and chewings, hard, and red fescues cannot be achieved based on floret characteristics. The CFIA M&P sec. 3.8.1 allows for these kinds to not be required to be separated. Since these kinds are often found in marketed seed mixtures a standardized method to handle purity analyses of such seed mixtures must be agreed upon. One possible method is presented in the proposal under 3.7.d (2). This method will allow for use of the multiple unit factors and thus allow for more efficiency in the laboratory. The alternative is to ban the use of the multiple factors when such indistinguishable species are found in a seed mixture. Under the ban, all multiple units will be required to be manually separated into single fertile florets. Sterile structures removed in the manual separation process will be classified as inert matter.

At present, the ISTA Rules for Seed Testing (ISTA Rules) does not utilize factors for multiple seed units and does not allow for the testing of seed mixtures; therefore, any change in the AOSA Rules regarding the existing multiple unit procedure and the testing of seed mixtures should be of no consequence since the two sets of rules are already non-compatible.

References:

AOSA. 2008. Cultivar Purity Handbook, Contribution No. 33 to the handbook on seed testing. Association of Official Seed Analysts, Ithaca, NY.

Hurst, S. J. 1986. Clarification of section 2.12, multiple unit procedures. AOSA News Letter 60(1):10.

Musil, A. F. 1963. Identification of crop and weed seeds, Agriculture Handbook No. 219. U. S. Dept. of Agriculture, Washington, D. C. 171 pp.

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