RULE PROPOSALS - 1996

AOSA Rules Committee
Rodney W. Young, Chair

The following nine proposals for changes in or additions to the AOSA Rules have been reviewed and approved by the Rules Committee for further consideration by the AOSA membership at the 1996 meeting. Please note that approval does not mean that the committee or the members endorse these proposals.

These proposals are published in the February 1996 issue of The Newsletter of the Association of Official Seed Analysts so they may be evaluated at least 90 days in advance of the annual meeting. The names and addresses of the authors are included. Please contact them if you need additional information. You may also submit written comments to the Rules Chair prior to the meeting. Although comment time will be available during the Open Rules meeting, extensive changes to the proposals will not be made during the meeting. Since only a limited number of copies of these proposals will be available at the Open Rules meeting please bring your copy of this Newletter with you.

PROPOSAL #1

RULE PROPOSAL

PRESENT RULE:

New Rule

PROPOSED ADDITION TO PRESENT RULE:

TABLE 4.

Kind of seed	substrate	temp	first	final	additional directions
Penstemon penlandii (method 1) L. Weber Penland's beardtongue	P	15-25°C	7	14	aerated GA_3 (350ppm) (see sec. 4.8-m)
(method 2)	P	15-25°C	7	14	see sec. 4.9-k.

4.8-m.

Penstemon penlandii --For dormant samples, two methods can be used: method 1, submerge 400 seed in aerated ($15ccs^{-1}$) GA_3 (350ppm) for 24h at room temperature using an aquarium pump. Use enough volume of GA_3 to completely cover seeds. After treatment, blot excess moisture off seeds and place seeds on water moistened blotters and germinate at 15-25°C. After 14 days, count normal seedlings and clip either end of remaining ungerminated seed and continue germination for 7 additional days. Seed which germinate after clipping should be reported as dormant. Method 2, plant 400 seeds on water moistened blotters and germinate for 14 days, evaluate ungerminated seeds with TZ. Viable seeds as determined by TZ should be reported as dormant seed (4.9-k).

Table 1 Weights for working sample of Flower Seeds.

Kind of seed	Minimum weight for purity analysis	Minimum weight for noxious-weed seed	Apprx # of seeds per gram	Apprx # of seeds per ounce
	Grams	Grams	Number	Number
Penstemon penlandii L. Weber Penland's beardtongue	3.6	36	693	19,647

SUPPORTING EVIDENCE:

The AOSA Rules for Testing Seed handbook has germination requirements for seven species of *Penstemon*. Only one of the species listed has a dormancy breaking treatment (60d prechill). A number of studies have shown that seeds of many *Penstemon* species possess varying degrees of dormancy. Prechilling for varying time intervals, gibberellic acid treatments and seed scarification have all been shown to be effective in breaking dormancy in intermountain and native species. Addition of this species and the additional directions to the rules would assist seed analysts to determine seed viability when other dormant species of *Penstemon* are under investigation.

A paper has been submitted to JOST for publication that describes all dormancy breaking treatments and thermogradient plate analysis and results (see Program and Abstracts, Society of Commercial Seed Technologists and Association of Official Seed Analysts, 1995 or contact us for a copy of paper). Several scarification treatments, germination temperatures, and moistening agents were evaluated in these studies. The methods used for the supporting evidence reported here were based on these previous studies.

The data to support the additional treatment proposed in this rule follows:
Four replications of 50 seeds from 2 lots of *Penstemon penlandii* received the following treatments and placed in a 15-25°C germinator:

1. Seeds were submerged for 24h in aerated ($15ccs^{-1}$) 1mM GA_3 (346ppm), placed on water-moistened blotters , first counts were done after 14d, remaining seeds were then scarified with a razor blade at either end of the seed and final counts were conducted after 21d.

2. Seeds were scarified with a razor blade and placed on water-moistened blotters. Counts were made after 14 and 21d.

3. Non-scarified seeds were placed on water-moistened blotters and counts were made after 14 and 21d.

Results indicated that after 21d of germination, seeds submerged in the 1mM GA_3 and remaining dormant seeds clipped at 14d, were comparable to TZ viability and to hand scarification (Fig. 1&2). Although normal seedlings in lot #1 were slightly lower (76%) than the viability as determined by TZ and hand scarification, we feel that this method would be optimum due to decreasing the number of dead or abnormal seedlings produced by improper hand scarification (i.e. if there are fewer seeds to be hand scarified, there is less chance of damaging or killing the seeds due to inexperienced hand scarification with this species). Normal seedlings from GA_3 treatment (93%) and hand scarification (91%) in lot #2 were comparable to TZ viability of 95%. In previous studies, higher germination rates always occurred with scarification (hand or mechanical) than with the use of GA_3 alone, this method combines the positive germination effects of both treatments.

Results from previous studies using a thermogradient plate and individual germinators indicated that 15-30°C was optimum for germination of this species. Most laboratories have 15-25°

germinators and this study has shown that 15-25° C is not significantly lower in germination of this species.

SUBMITTED BY:

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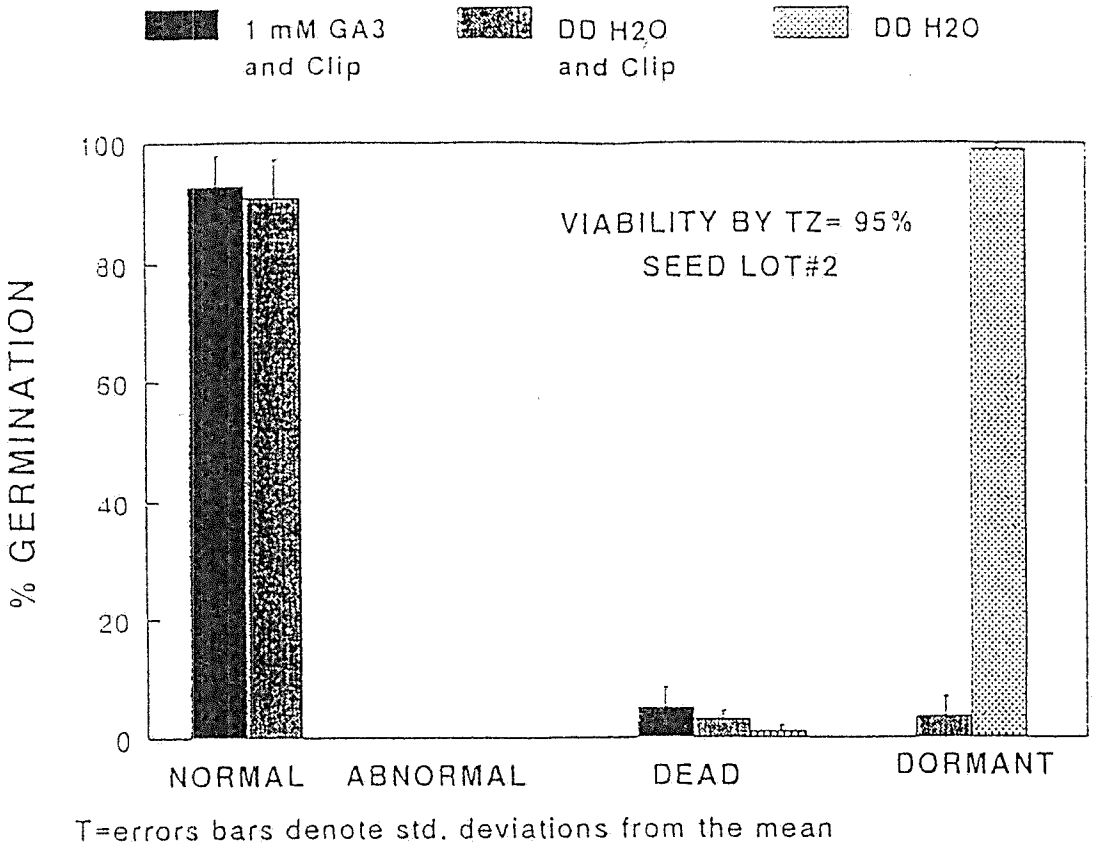
DATE OF PROPOSAL:

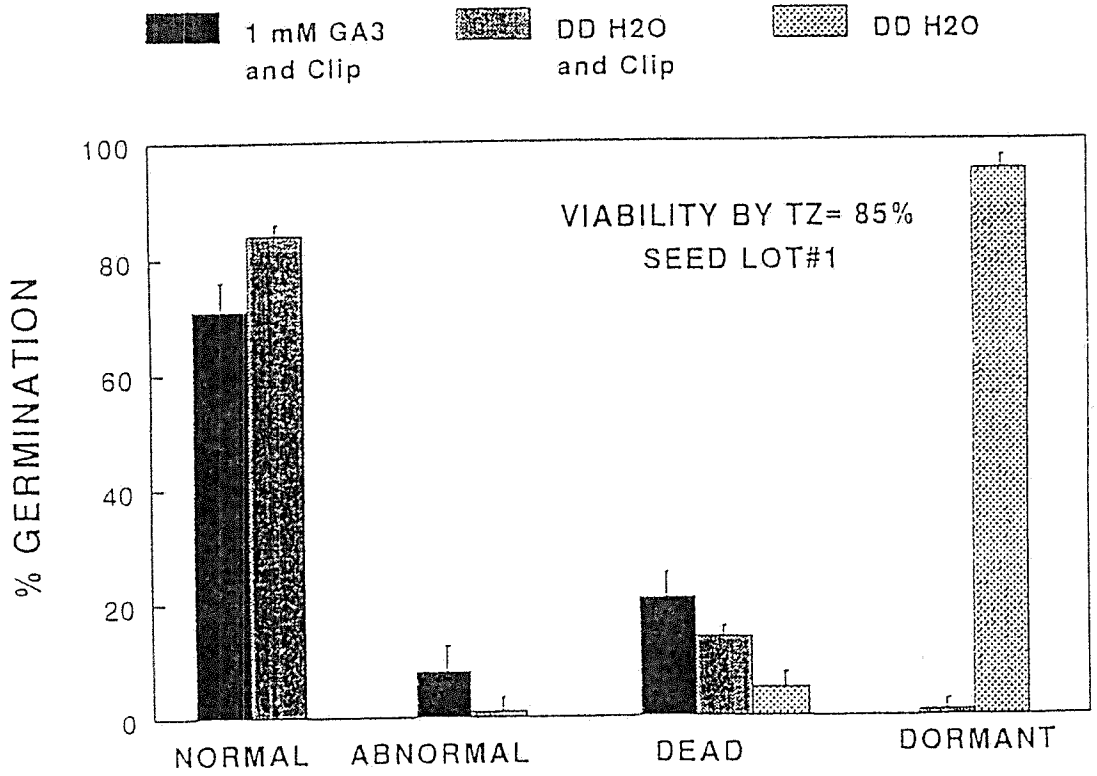
October 2, 1995

Fig.1 Mean germination of P. penlandii 21 days after treatments.



T=errors bars denote std. deviations from the mean

Fig.2 Mean germination of P. penlandii 21 days after treatments.



T=error bars denote std. deviations from the mean

PROPOSAL #2

Rule Proposal Change for *Eustoma grandiflorum*

Present Rule (if new rule, state "New Rule")

Kind of seed	Substrata	Temperature °C	First count days	Final count days	Additional direction
Eustoma grandiflorum (Rafinesque) Shinners - prairie gentian	TB	20; 20-30	7	14	Light; the native species may not germinate with procedures.

Proposed Rule (Exactly as it would appear in "Rules")

Kind of seed	Substrata	Temperature °C	First count days	Final count days	Additional direction
Eustoma grandiflorum (Rafinesque) Shinners - prairie gentian, gentian,tulip, eustoma, lisianthus	TB	20; 20-30	14	21	Light; the native species may not germinate with these procedures. On slow germinating lots, final count may need to be extended to 28 days.

Supporting Evidence (Research data, literature citations, published papers, or other appropriate information)

See attached information and examples from trade catalogues and magazines.

Submitted by (name, complete address, and phone number)

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Date of Proposal

October 6, 1995

Supporting evidence:
Change for *Eustoma grandiflorum*

Eustoma grandiflorum (Raf.) Shinn. : *Lisianthus russellianus*
Eustoma russellianum: E. Grandiflorum
Lisianthus russellianus; Eustoma grandiflorum

Hortus Third lists all the names above as the same. The common name listed by Hortus is prairie gentian. Handbook 25, Uniform Classification of Weed and Crop Seeds list tulip, gentian as the common name. The trade is using a part of scientific names, eustoma and lisianthus, as a common name. Please see the examples from catalogues and trade magazine. Because the trade people are using eustoma and lisian- this as common names and handbook 25 had tulip, gentian, these needed to be added to the rules for easier reference (and cross reference with handbook 25).

Ref:
Hortus Third, 1976, Pgs 467 and 670
Uniform Classification of Weeds and Crops; Contribution 25 to the Handbook on Seed Testing, Association of Official Seed Analysts, 1993

Germination Time:
Please see attached Table.
The data represents the seed which is being sold on the market and being submitted to the laboratories. The data was collected over a two year period and has information on new, carryover and pelleted seed.

The current rules only allow a maximum of 14 days with a two day extension for complete germination. The seed may have just started germinating in 7 days but hasn't been developed enough to determine normal seedlings. From experience, 10 day first count is also insufficient. There are also some circumstances, in which slow germinating lots may need 28 days, a 2 day extension is also insufficient.

The test show that the first count needs to be in 14 and final count in 21 days and in a few circumstances, the test needs to be extended to 28 days for slow growing lots.

The seed was germinated on top of blue blotters, in boxes at 20C with light.. Additional data was also gathered for seed germinated on TB at the alternating temperature of 20-30C.

The data doesn't represent results from any testing of native eustoma seed.

Eustoma grandiflorum - Lisianthus

Sample #	7 day Avg. % germ	14 day Avg. % germ	21 day Avg. % germ	28 day Avg. % germ	Total % germ	Comments
Temperature alternating 20 to 30 degrees Celsius						
1	0	69	7		76	
2	0	53	15		68	pelleted
3	0	59	15		74	pelleted
4	0	61	24		85	
5	0	65	20		85	
6	0	75	11		86	
7	0	87	7		94	
8	0	88	8		96	
9	0	79	17		96	
10	0	82	9		91	
11	0	73	11		84	
12	0	92	1		93	
13	0	74	16		90	pelleted
14	0	73	4		77	
15	0	98	0		98	
16	0	97	1		98	
17	0	84	9		93	
18	0	74	0		74	
19	0	79	20		99	
20	0	95	1		96	
21	0	86	6		92	
22	0	81	2		83	
23	0	66	23		89	
24	0	70	15		85	
25	0	78	10		88	
26	0	73	2		75	
27	0	51	20		71	pelleted
28	0	59	23		82	pelleted
29	0	57	23		80	pelleted
30	0	91	4		95	carry-over
Temperature constant 20 degrees Celsius						
1	0	7	84		91	
2	0	40	46		86	carry-over
3	0	50	32		82	carry-over
4	0	14	67		81	carry-over
5	0	20	65		85	carryover
6	0	34	4		39	
7	0	15	15	29	59	
8	0	14	16	16	59	
9	0	0	95		95	
10	0	0	88		88	
11	0	0	51	12	63	
12	0	0	93		93	
13	0	8	42		50	

Sample #	7 day Avg. % germ	14 day Avg. % germ	21 day Avg. % germ	28 day Avg. % germ	Total % germ	Comments
14	0	11	69		80	
15	0	11	49		60	
16	0	10	57		67	
17	0	8	60		68	
18	0	12	63		75	carry-over
19	0	39	36		75	
20	0	9	76		86	carry-over
21	0	15	67		82	
22	0	2	58		60	
23	0	2	61		63	carry-over
24	0	0	92		92	pelleted
25	0	0	94		94	pelleted
26	0	0	95		95	pelleted
27	0	0	93		93	
Temperature alternating 20 to 30 degrees Celsius						
1	0	16	45		61	pellet
2	0	56	26		82	pellet
3	0	71	13		84	raw
4	0	77	7		84	pellet
5	0	40	43		83	pellet
6	0	94	3		97	raw
7	0	62	11		73	pellet
8	0	63	16		79	pellet
9	0	71	7		78	raw
10	0	57	22		79	pellet
11	0	88	8		96	pellet
12	0	74	19		93	pellet
13	0	25	67		92	pellet
14	0	88	11		99	pellet
15	0	67	25		92	pellet
16	0	61	30		91	pellet
17	0	66	21		87	pellet
18	0	90	1	4	95	pellet
19	0	83	10		93	carryover\raw
20	0	87	7		94	carryover\raw
21	0	70	13		83	pellet
22	0	59	25		84	pellet
23	0	86	12		98	pellet
24	0	18	47		65	carryover\raw
25	0	30	40		70	carryover\raw
26	0	30	49		79	pellet
27	0	42	34		76	carryover\raw
28	0	11	52		83	carryover\raw
29	0	20	52	13	85	pellet
30	0	46	39		85	carryover/raw
31	0	68	23		91	pellet
32	0	57	34		91	carryover/raw

Sample #	7 day Avg. % germ	14 day Avg. % germ	21 day Avg. % germ	28 day Avg. % germ	Total % germ	Comments
33	0	58	33		91	pellet
34	0	13	64		77	pellet
35	0	11	67	10	88	pellet
36	0	16	54	14	84	pellet
37	0	37	47		84	carryover/raw
38	0	53	38		91	carryover/raw
39	0	68	29		97	pellet
40	0	47	50		97	pellet
41	0	56	26	6	88	pellet
42	0	46	31	8	84	pellet
43	0	35	39	3	77	pellet
44	0	33	43	6	82	pellet
45	0	28	48	7	83	pellet
46	0	88	5		93	raw
47	0	63	28		91	raw
48	0	74	20		94	raw
49	0	75	11		86	raw
50	0	76	15		91	raw
51	0	72	14		86	raw

PROPOSAL #3

Rule Proposal Uniform Classification of Weed and Crop Seeds

Present Rule (if new rule, state "New Rule")

Appendix A

Common name	Scientific Name
tulip, gentian	= *Eustoma grandiforum*

Proposed Rule (Exactly as it would appear in "Rules") If common names added to classification

Appendix A Add common names in appropriate alphabetical order.

Common name	Scientific name
tulip, gentian	=*Eustoma grandiflorum*
eustoma	=*Eustoma grandiflorum*
lisianthus	=*Eustoma grandiflorum*
prairie gentian	=*Eustoma grandiflorum*

Supporting Evidence (Research data, literature citations, published papers, or other appropriate information

These additional listings will aid the analyst to find the correct information.

Please see examples with the Rules change proposal for *Eustoma grandiflorum.*

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Date of Proposal

October 6, 1995

Rule Proposal Uniform Classification of Weed and Crop Seeds

Present Rule (if new rule, state "New Rule")

Classification section

Eustoma grandiflorum -tulip, gentian	(Gentianaceae)	F,W	W C W W W W W	NO

Proposed Rule (Exactly as it would appear in "Rules")

Eustoma grandiflorum -tulip, gentian -eustoma -lisianthus -prairie gentian	(Gentianaceae)	F,W	W C W W W W W	NO

Supporting Evidence (Research data, literature citations, published papers, or other appropriate information

Add the common names being used currently in AOSA rules - prairie gentian.
Add names that are being used in the trade, which will aid the analyst in finding the correct information.
Please see examples with the rules change proposal for E*ustoma grandiflorum.*

Submitted by (name, complete address, and phone number)

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Date of Proposal

October 6, 1995

PROPOSAL #5

Rule Change Proposal

Present Rule

2.6 Seed Unit.

b.(2) Multiple florets and spikelets in tall oatgrass (Arrhenatherum elatius), oats (Avena spp.), gramas (Bouteloua spp.), rhodesgrass (Chloris gayana), barley (Hordeum vulgare), and bluegrass (Poa spp.);

(3) Entire spikelets in Agrostis, Brachiaria ramosa, Oryza, Panicum, Paspalum, and Setaria. Entire spikelets which may have attached rachis segments, pedicels and sterile spikelets in Andropogon, Bothriochloa ischaemum, Elymus elymoides, Schizachyrium scoparium, Sorghastrum, and Sorghum;

(4) Spikelet groups that disarticulate as a unit in galleta grass (Hilaria jamesii), spikelet groups that disarticulate as units with attached rachis and internodes in bluestems (Andropogon spp., Bothriochloa ischaemum, Schizachyrium scoparium, side-oats grama (Bouteloua curtipendula) and yellow indiangrass (Sorghastrum nutans);

(5) Fascicles of buffelgrass (Cenchrus ciliaris) consisting of bristles and spikelets;

(6) Burs of buffalograss (Buchloe dactyloides);

(7) Bublets of bulbous bluegrass (Poa bulbosa);

Proposed Rule

2.6 Seed Unit.

b.(2) Single floret spikelets in Agrostis, Alopecurus, and Zoysia; and multiple florets or spikelets in Anthoxanthum, Arrhenatherum, Avena, Axonopus, Bouteloua, Brachiaria, Chloris, Echinochloa, Ehrharta, Holcus, Hordeum, Melinis, Oryza, Panicum, Paspalum, Phalaris, Poa, Setaria, and Zea;

(3) Spikelets which may have attached rachis segments, pedicels and sterile spikelets in Andropogon, Bothriochloa ischaemum, Schizachyrium scoparium, Sorghastrum, and Sorghum;

(4) Spikelet groups that disarticulate as a unit in Hilaria jamesii; spikelet groups that disarticulate as units with attached rachis and internodes in Andropogon spp., Bothriochloa ischaemum, Schizachyrium scoparium, Elymus elymoides, Bouteloua curtipendula and Sorghastrum nutans;

(5) Fascicles of Cenchrus ciliaris and Pennisetum, consisting of bristles and spikelets;

(6) Burs of Buchloe dactyloides;

(7) Bulblets of Poa bulbosa;

Supporting Evidence

The general assumption in the current Rules has been that all grass genera are classified under 2.6b(1) caryopses and single florets, unless indicated as an exception under sections 2.6b(2) through (8). There are however several genera for which no exception is stated and which clearly would be misplaced under section 2.6b(1). These include Alopecurus, Anthoxanthum, Axonopus, Echinochloa, Ehrharta, Holcus, Melinis, Pennisetum, Phalaris, Zea, and Zoysia. The naturally occurring seed units of these genera have adhering structures, other than the lemma and palea of the fertile floret, which would be laborious or impossible to remove during a purity examination. In addition, Elymus elymoides has been improperly placed in section 2.6b(3). Based on morphological structures, this species corresponds best to section 2.6b(4). The morphological structures of the previously mentioned grasses are discussed in the paper: Understanding Grass Family Seed Units, D. Meyer, AOSA News Letter, Vol. 70, No.1, February 1996.

Editorial changes in the proposal include removal of common names, specific epithets and spp. designations as a matter of consistency throughout the section. Section 2.6b(2) with part of section 2.6b(3) were combined together as technically there is not difference between "spikelets" and "entire spikelets".

Submitted By

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Date

October 13, 1995

RULE CHANGE PROPOSAL FORM

PRESENT RULE *(If new rule, state "New Rule")*

NEW RULE

PROPOSED RULE *(Exactly as it would appear in "Rules")*

APPENDIX 1B. MATHEMATICAL PRINCIPLES

These mathematical principles are to be used only when calculating results of a bulk examination (section **3.6**) as percentage by weight. For the principles to be used to calculate percentage by weight for components of a purity analysis refer to sections **2.5a** and **2.5b**.

Brief review of math:

Definition - **significant figures**: digits in a number that are known to be reasonably trustworthy. They would include the last digit (which has some degree of uncertainty) as well as all the previous digits. Zeros are considered significant except when their only function is to locate the decimal point.

Examples:

1. All non-zero digits are significant; *e.g.* 363 has three significant figures.

2. Zeros located between non-zero digits are significant; *e.g.* 2007 has four significant figures.

3. When a decimal ends in zeros, these zeros are significant; *e.g.* 43.270 has five significant figures.

4. When a number ends in zeros, these zeros are not significant unless they are specified as being significant or indicated as significant by a line drawn under them; *e.g.* 17000 has two significant figures (1,7), 17000 has three significant figures (1,7,0), 17000 has five significant figures (1,7,0,0,0), and 1070 has three significant figures (1,0,7).

5. In a decimal fraction (when the number is between 0 and 1), the zeros immediately following the decimal point are not significant; *e.g.* 0.00351 has three significant figures (3,5,1), 3.0051 has five significant figures (3,0,0,5,1), and 0.0030 has two significant numbers (3,0).

Definition - **accuracy**: the number of significant figures of a decimal number.

Example:

The numbers 50.3 and 0.00754 are both accurate to three significant figures.

Definition - **precision:** the number of decimal places of a decimal number.

Example:

The number 4.016 is said to be precise to three decimal places.

Literature:

Calter, P. 1979. *Schaum's outline of theory and problems of technical mathematics*. McGraw-Hill Book Co., New York, NY. 460 pp.

Stein, E. I. 1980. *Fundamentals of mathematics*. Allyn and Bacon, inc., Boston, MA. 651 pp.

SUPPORTING EVIDENCE *(Research data, literature citations, published papers, or other appropriate information)*

At the open Rules Committee meeting in Sacramento, California in 1995, the discussion of the bulk examination proposal included suggestions for improving the proposal. One such suggestion was to include in the Rules the brief review of math given in the Supporting Evidence for the proposal. Rather than make such a major change in the proposal at the meeting, it was decided that this change would be submitted to the membership as a proposal in 1996. This proposal, if adopted, will add these principles to the Rules as **Appendix 1B.**

SUBMITTED BY *(Name, complete address, and phone number)*

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DATE OF PROPOSAL

October 13, 1995

RULE CHANGE PROPOSAL FORM

PRESENT RULE *(If new rule, state "New Rule")*

APPENDIX 1. CONVERSION OF SAMPLE WEIGHTS

1. When converting numbers of seeds found in the working sample to the number of seeds per pound, the following formula shall be used:

$$\frac{\text{453.6 grams x number of seeds found}}{\text{weight of working sample (grams)}} = \text{number of seeds per pound}$$

2. When converting numbers of seeds found in the working sample to the number of seeds per ounce, the following formula shall be used:

$$\frac{\text{28.35 grams x number of seeds found}}{\text{weight of working sample (grams)}} = \text{number of seeds per ounce}$$

When using the above formulas, use the actual weight of the working sample (four significant figures). The final result shall be rounded to a whole number when reporting seeds per pound and to the first decimal place when reporting seeds per ounce. When rounding off the final result to a whole number, round down if the first decimal place is 4 or less and round up if the first decimal place is 5 or more. When rounding off the final result to the first decimal place, round down if the second decimal place is 4 or less and round up if the second decimal place is 5 or more.

Example 1. In a 50 gram noxious-weed examination of alfalfa seed with an actual working weight of 50.15 grams, 7 dodder seeds were found. For number of seeds per pound (Formula 1):

$$\frac{\text{453.6 grams x 7}}{\text{50.15 grams}} = 63.31 \text{ seeds}$$

then

round to the nearest whole number

= 63 seeds per pound

Example 2. In a 2 gram purity examination of white clover, with an actual working weight of 2.221 grams, 1 chickweed seed was found. For number of seeds per pound (Formula 1):

$$\frac{\text{453.6 grams x 1}}{\text{2.221 grams}} = 204.2 \text{ seeds}$$

then

round to the nearest whole number

= 204 seeds per pound

Example 3. In a 10 gram noxious-weed seed examination of Kentucky bluegrass, with an actual working weight of 10.13 grams, 4 Canada thistle achenes were found. For number of seeds per ounce (Formula 2):

$$\frac{\text{28.35 grams x 4}}{\text{10.13 grams}} = 11.19 \text{ seeds}$$

then

round to one decimal place

= 11.2 seeds per ounce

Example 4. In a .25 gram purity examination of bentgrass, with an actual working weight of .2584 grams, 3 windgrass florets were found. For number of seeds per ounce (Formula 2):

$$\frac{\text{28.35 grams x 3}}{\text{.2584 grams}} = 329.14 \text{ seeds}$$

then

round to one decimal place

= 329.1 seeds per ounce

APPENDIX 1A. CONVERSION OF SAMPLE WEIGHTS

1. When converting numbers of seeds or particles of inert matter found in a noxious weed seed or bulk examination to the number of seeds or particles per pound, the following formula shall be used:

$$\frac{\text{number of seeds or particles found}}{\text{weight of working sample in grams}} \times \frac{453.6 \text{ grams}}{\text{pound}} = \text{number of seeds or particles per pound}$$

2. When converting numbers of seeds or particles of inert matter found in a noxious weed seed or bulk examination to the number of seeds or particles per ounce, the following formula shall be used:

$$\frac{\text{number of seeds or particles found}}{\text{weight of working sample in grams}} \times \frac{28.35 \text{ grams}}{\text{ounce}} = \text{number of seeds or particles per ounce}$$

3. When converting numbers of seeds or particles of inert matter found in a noxious weed seed or bulk examination to the number of seeds or particles per kilogram, the following formula shall be used:

$$\frac{\text{number of seeds or particles found}}{\text{weight of working sample in grams}} \times \frac{1000 \text{ grams}}{\text{kilogram}} = \text{number of seeds or particles per kilogram}$$

When using the above formulas, use the actual weight of the working sample (four significant figures). The final result shall be rounded to a whole number when reporting seed per pound or kilogram and to the first decimal place when reporting seeds per ounce. When rounding off the final result to a whole number, round down if the first decimal place is 4 or less and round up if the first decimal place is 5 or more. When rounding off the final result to the first decimal place, round down if the second decimal place is 4 or less and round up if the second decimal place is 5 or more.

Example 1. In a 50 gram noxious-weed examination of alfalfa seed with an actual working weight of 50.15 grams, 7 dodder seeds were found. For number of seeds per pound (Formula 1):

$$\frac{7 \text{ seeds}}{50.15 \text{ grams}} \times \frac{453.6 \text{ grams}}{\text{pound}} = 63.31 \text{ seeds per pound}$$

rounded to the nearest whole number = 63 seeds per pound

Example 2. In a 20 gram bulk examination of white clover, with an actual working weight of 22.21 grams, 10 chickweed seeds were found. For the number of seeds per pound (Formula 1):

$$\frac{10 \text{ seeds}}{22.21 \text{ grams}} \times \frac{453.6 \text{ grams}}{\text{pound}} = 204.2 \text{ seeds per pound}$$

rounded to the nearest whole number = 204 seeds per pound

Example 3. *Calculation of the rate of occurrence of noxious weed seeds when the number of seeds found in a purity examination exceeds the number specified in section 3.1.* - In a 1 gram purity examination of Kentucky bluegrass, with an actual working weight of 1.013 grams, 24 Canada thistle achenes were found. For the number of seeds per ounce (Formula 2):

$$\frac{24 \text{ seeds}}{1.013 \text{ grams}} \times \frac{28.35 \text{ grams}}{\text{ounce}} = 671.67 \text{ seeds per ounce}$$

rounded to one decimal place = 671.7 seeds per ounce

Example 4. In a 2.5 gram bulk examination of bentgrass, with an actual working weight of 2.584 grams, 3 windgrass florets were found. For number of seeds per ounce (Formula 2):

$$\frac{3 \text{ seeds}}{2.584 \text{ grams}} \times \frac{28.35 \text{ grams}}{\text{ounce}} = 32.91 \text{ seeds per ounce}$$

rounded to one decimal place = 32.9 seeds per ounce

Example 5. In a 500 gram bulk examination of soybeans, with an actual working weight of 502.5 grams, 6 hairy vetch seeds were found. For number of seeds per kilogram (Formula 3):

$$\frac{6 \text{ seeds}}{502.5 \text{ grams}} \times \frac{1000 \text{ grams}}{\text{kilogram}} = 11.94 \text{ seeds per kilogram}$$

rounded to the nearest whole number = 12 seeds per kilogram

SUPPORTING EVIDENCE (*Research data, literature citations, published papers, or other appropriate information*)

Appendix 1 is modified in this proposal to:

1. Include examples of calculations of the number of seeds or particles of inert matter found in a bulk examination.

2. Give a formula for the calculation of the number of seeds or particles per kilogram.

3. Retain the rounding procedures in **Appendix 1** so that noxious weed seed and bulk examination results of number per unit weight are reported in the same manner.

4. Eliminate examples of calculations of rate of occurrence based on a purity analysis, except for Example 3. Example 3 is an example of a calculation of the number of noxious weed seeds per unit weight, based on finding noxious weed seeds in excess of numbers given in section **3.1**. The purity rules require results to be expressed as per cent by weight, not number per unit weight. Only the rules for noxious weed seed and bulk examination specifically require or allow expression of results as number per unit weight.

5. Change **Appendix 1** to **Appendix 1A** if the proposal for addition of **Appendix 1B** is approved.

SUBMITTED BY *(Name, complete address, and phone number)*

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DATE OF PROPOSAL

October 13, 1995

PROPOSAL #8

RULE CHANGE PROPOSAL FORM

PRESENT RULE *(If new rule, state "New Rule")*

3.1 Noxious-weed seeds. The determination of the number of seeds, bulblets, or tubers of individual noxious weeds present per unit weight should be made on at least the minimum quantities listed in Table 1: Provided, that if the following indicated numbers of a single kind of seed, bulblet, or tuber are found in the analysis of the purity working sample (or in a like amount of the noxious-weed seed working sample), the occurrence of that species in the remainder of the bulk examined for noxious-weed seeds need not be noted: 1/2-gram purity working sample, 16 seeds; 1-gram purity working sample, 23 seeds; 2-gram purity working sample or larger, 30 seeds.

The seeds per unit weight shall be based on the number of single seeds. The number of individual seeds shall be determined in burs of sandbur (*Cenchrus* spp.) and cocklebur (*Xanthium* spp.), capsules of dodder (*Cuscuta* spp.), berries of horsenettle and nightshade (Solanaceae), and in the fruits of other noxious weeds that contain more than one seed. Refer to sections 2.9 and 2.10b(4).

PROPOSED RULE *(Exactly as it would appear in "Rules")*

3.1 Noxious-weed seeds. The determination of the number of seeds, bulblets, or tubers of individual noxious weeds present per unit weight should be made on at least the minimum quantities listed in Table 1: Provided, that if the following indicated numbers of a single kind of seed, bulblet, or tuber are found in the analysis of the purity working sample (or in a like amount of the noxious-weed seed working sample), the occurrence of that species in the remainder of the bulk examined for noxious-weed seeds need not be noted: 1/2-gram purity working sample, 16 seeds; 1-gram purity working sample, 23 seeds; 2-gram purity working sample or larger, 30 seeds. The working sample shall be weighed to four significant figures. Refer to **Appendix 1A** for examples of calculations of the number of noxious weed seeds per unit weight. State laws may specify the unit weight to express the rate of occurrence of noxious weed seeds.

The seeds per unit weight shall be based on the number of single seeds. The number of individual seeds shall be determined in burs of sandbur (*Cenchrus* spp.) and cocklebur (*Xanthium* spp.), capsules of dodder (*Cuscuta* spp.), berries of horsenettle and nightshade (*Solanum* spp.), and in fruits of other noxious weeds that contain more than one seed. Refer to sections 2.9 and 2.10b(4).

SUPPORTING EVIDENCE *(Research data, literature citations, published papers, or other appropriate information)*

This proposal adds to section **3.1** the instruction to weigh the noxious weed seed examination working sample to four significant figures, as is currently specified in **Appendix 1**. The proposal also references **Appendix 1A** if the proposal for **Appendix 1A** is passed. Also, Solanaceae in the second paragraph is changed to *Solanum* spp. to be taxonomically consistent with other examples of noxious weeds in this section.

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RULE CHANGE PROPOSAL FORM

PRESENT RULE *(If new rule, state "New Rule")*

3.6 Bulk examination. – The examination is conducted to determine the occurrence of particular components in the sample. The component may be seeds of individual species or particles of certain inert matter (e.g. ergot or soil). The rate of occurrence may be expressed as the number of seeds or particles per unit weight or as percentage by weight.

The working weight of the sample shall be made on at least the minimum quantities listed in Table 1 under the heading "Minimum weight for noxious weed seed or bulk examination." The working weight shall be determined to at least four significant figures. If the balance used has sufficient precision, the sample may be weighed to more than four significant figures.

The seeds per unit weight shall be based on individual seeds. The number of individual seeds shall be determined in fruits that contain more than one seed.

To calculate percentage by weight, the total weight is determined for all seeds of individual species or all particles of inert components. The component may be weighed as accurately as the precision of available weighing equipment permits. The percentage of each component shall be calculated on the basis of the original weight of the working sample. The percentage may be expressed to the same number of significant figures as the weight (either the component weight or the original weight of the working sample) with the least number of significant figures. When rounding off the final result, round down if the next decimal place is four or less and round up if the next decimal place is five or more.

Examples:

(1) Bulk examination for sclerotia

crop: *Brassica oleracea*

fifty gram examination, actual working weight 50.33g (four significant figures)

three sclerotia found weighing 0.00838g (three significant figures); weight with least number of significant figures

0.00838g ÷ 50.33g X 100 = 0.016650109%, rounded off to 0.0167% (three significant figures)

(2) Bulk examination for soil

crop: *Phaseolus vulgaris*

five hundred gram examination, actual working weight 500.3g (four significant figures); weight with least number of significant figures

nine pieces of soil found weighing 1.0031g (five significant figures)

1.0031g ÷ 500.3g X 100 = 0.2004997%, rounded off to 0.2005% (four significant figures)

PROPOSED RULE *(Exactly as it would appear in "Rules")*

3.6 Bulk examination. -- The examination is conducted to determine the occurrence of particular components in the sample. The component may be seeds of individual species or particles of certain inert matter (e.g. ergot or soil). The rate of occurrence may be expressed as the number of seeds or particles per unit weight or as percentage by weight.

The working weight of the sample shall be made on at least the minimum quantities listed in Table 1 under the heading "Minimum weight for noxious weed seed or bulk examination." The working weight shall be determined to at least four significant figures. If the balance used has sufficient precision, the sample may be weighed to more than four significant figures.

The seeds per unit weight shall be based on individual seeds. The number of individual seeds shall be determined in fruits that contain more than one seed.

Refer to **Appendix 1A** for examples of calculations of seed or particles of inert matter per unit weight. The sender of the sample may specify the unit weight to be used to express the rate of occurrence of seeds or particles in a bulk examination.

To calculate percentage by weight, the total weight is determined for all seeds of individual species or all particles of inert components. The component may be weighed as accurately as the precision of available weighing equipment permits. The percentage of each component shall be calculated on the basis of the original weight of the working sample. The percentage may be expressed to the same number of significant figures as the weight (either the component weight or the original weight of the working sample) with the least number of significant figures. When rounding off the final result, round down if the next decimal place is four or less and round up if the next decimal place is five or more.
Refer to **Appendix 1B** for mathemathical principles used in calculating percentage by weight in the bulk examination.

Examples: The examples are not changed in proposed rule.

SUPPORTING EVIDENCE *(Research data, literature citations, published papers, or other appropriate information)*

The proposal references **Appendix 1A** and **Appendix 1B** where appropriate. This change is needed if the proposals concerning **Appendix 1A** and **Appendix 1B** are passed.

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