RULE PROPOSALS - 1986

AOSA Rules Committee
Stephen J. Hurst, Chairman

The following proposals for changes in or additions to the AOSA Rules For Testing Seeds have been evaluated and approved by the Rules Committee. Approval does not necessarily mean that the Committee members endorse these changes or additions to the Rules.

Eleven proposals are presented here in order that the AOSA membership can study them prior to voting on them at the June 1986 business meeting in Minnesota. Please read and review all proposals along with reasons and supporting evidence carefully so that you can cast a well informed vote on them. The name and address of the person(s) submitting each proposal is given in case you need to contact them for any additional information, if necessary.

Comments anyone might have concerning content or wording of these proposals can be forwarded to the Rules Committee Chairman. Your comments will be presented and discussed at the Open Rules Committee meeting in June. It is possible, but not desirable to make extensive adjustments to proposals at the Annual Meeting.

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1. PROPOSAL

Change in seedling descriptions of Section 7a. in APPENDIX 1:

7.Fabaceae, legume or pea family (USDA Handbook 30 pp. 142-146).

a. Vigna radiata, mung-bean; Vigna angularis, adzuki-bean; Vigna unguiculata subsp. sesquipedalis, yard-long bean;	Vigna ungiculata subsp. unguiculata, cowpea; Phaseolus lunatus, lima bean; Phaseolus vulgaris, field or garden bean. (USDA Handbook 30 pp. 153&156; figs. 44-47).

PRESENT RULE

Normal seedling

Epicotyl One or two primary leaves and an intact terminal bud.

Abnormal seedling

Epicotyl (c) No primary leaves, but terminal bud present and axillary buds in one or both axils of the cotyledons (partial baldhead).
(d) Primary leaves very small and pale (partial baldhead).

PROPOSED RULE

Normal seedling

Epicotyl One or two primary leaves proportional in size to the rest of the seedling and an intact terminal bud.

Abnormal seedling

Epicotyl (c) No primary leaves, but terminal bud present and axillary buds in one or both axils of the cotyledons.
(d) Primary leaves too small in proportion to the rest of the seedling, associated with visual defects of, or damage to the epicotyl.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

This change is intended to be a clarification of the current rule, which is very vague, as opposed to a new rule.

Over the years there has always seemed to be extreme variation in bean germination results. The Southern Idaho Seed Analysts Association was originally formed to address this problem and has tried to establish better correlation between laboratories testing beans, through the use of annual workshops and referee testing. This proposal came about as a result of this work.

This change will make the normal and abnormal statements on primary leaf size parallel and, in addition, will call attention to the importance of primary leaf size. It will also eliminate reference to "partial baldhead", a term that adds nothing to clarity and means different things to different people.

This description of primary leaves is preferable to an absolute comparison of leaf size, such as "at least 1/4 the area of a normal and typical primary leaf in the same test." Most North American analysts test beans in rolled paper towels and are likely to find seedlings in various stages of development in the same replicate, because seedlings which began germination later will have smaller primary leaves than faster germinating seedlings and may even have leaves still enclosed by the cotyledons. Position in the rolled towel will also affect the rate of seedling development due to differences in exposure to light. Therefore, this rule clarification will help to distinguish between leaves that are small due to test conditions or varietal characteristics, as opposed to ones that will result in an abnormal seedling.

This change also introduces the concept of proportion, a concept which may seem vague and non-objective, yet is a concept for which analysts develop awareness early in their experience. Proportion and visual damage will be discussed in the Fabaceae section of the forthcoming AOSA seedling description handbook. Drawings and/or photographs will depict seedlings with normal primary leaves and those with leaves that are proportionally small, along with examples of the damage which create these abnormal seedlings. Questions regarding the handbook should be directed to:

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SUBMITTED BY

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2. PROPOSAL

Addition of Astragalus cicer--cicer milkvetch to the Rules

PROPOSED RULE

1) Include in Table 1 (Weights for working samples, AGRICULTURAL SEEDS) the following:

Kind of seed	Minimum weight for purity analysis	Minimum weight for noxious-weed seed examination	Approximate number of seeds per gram	Approximate number of seeds per ounce
	Grams	Grams	Number	Number
Astragalus cicer L. cicer milkvetch	9	90	270	7660

2) Include in Table 3 (Methods of testing for laboratory germination, AGRICULTURAL SEEDS) the following:

Kind of seed	Substrata (See Sec. 4.9-a-b)	Temperature °C (See Sec. 4.9-c)	First count days (See Sec. 4.9-d)	Final count days
Astragalus cicer cicer milkvetch	B, TB, T	15-25	10	21[e]

[e]Hard seeds often present. See section 4.9k(6).

3) Include Astragalus cicer in the list of species under section 7d. (Small-seeded legumes) of APPENDIX 1. Seedling Descriptions for normal-abnormal classifications.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

1) The average weight of five hundred seeds from each of six samples was used to determine the working weights listed above.

2) Carleton et al. (1971) and Townsend and McGinnies (1972) germinated seeds of cicer milkvetch at various temperatures and recommended an alternating temperature regime of 15-25°C. Data from Townsend and McGinnies also indicate that a germination test of 21 days is sufficient for determining seed quality for this species.

Seeds from eight samples of cicer milkvetch were germinated at 15-25°C between blotters. At 10 days approximately half of the germination had occurred. A tetrazolium staining test at the end of the germination period showed that only 2% of the seeds were dormant after 26 days.

A referee sample was sent to eight AOSA seed laboratories for germination testing using the recommended procedure, with either "between blotters", "top of blotters" or "towelling" as the subtratum. Results from the referee sample test showed that similar determinations regarding seed quality of cicer milkvetch may be obtained using the method proposed.

A manuscript draft containing more detailed supporting evidence was reviewed by the Rules Committee and is available from Phil S. Allen.

LITERATURE CITED

Carleton, A.E., R.D. Austin, J.R. Stroh, L.E. Wiesner, and J.G. Scheetz. 1971. Cicer milkvetch (Astragalus cicer L.): seed germination, scarification and field emergence studies. Montana Agr. Exp. Sta. Bull. 655. 21 p.

Townsend, C.E. and W. J. McGinnies. 1972. Temperature requirements for seed germination of several forage legumes. Agronomy Journal 64:809-812.

SUBMITTED BY

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3. PROPOSAL

Addition of Atriplex canescens--fourwing saltbush to the Rules

PROPOSED RULE

1) Include in Table 1 (Weights for working samples, TREE and SHRUB SEEDS) the following:

Kind of seed	Minimum weight for purity analysis	Approximate number of seeds per gram	Approximate number of seeds per ounce
	Grams	Number	Number
Atriplex canescens (Pursh) Nuttall fourwing saltbush	19	146	4150

2) Include in Table 5 (Methods of testing for laboratory germination, TREE and SHRUB SEEDS) the following:

Kind of seed	Substrata	Temperature °C	Test duration days	Additional directions
Atriplex canescens fourwing saltbush	B	15	21	See footnote b.

[b]T.Z. tetrazolium: See section 4.9k(2).

3) Section 12. Tree and Shrubs of APPENDIX 1. Seedling Descriptions shall be used for normal-abnormal classifications.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

1) Five hundred seeds from each of seven samples were weighed to determine the approximate seed weight for this species.

2) In an experiment with seven seed collections germinated between blotters at 15°C, germination was nearly completed after 14 days. Several radicles were too small for normal-abnormal classifications, however, so a 21 day germination test period is recommended.

In a related experiment designed to test the effects of various temperature regimes on the germination of these same seven collections, two collections showed maximum germination at constant 15°C, two at alternating 15-25°C, and one each at constant 22°C, constant 25°C, and alternating 20-30°C. These results suggest that no single temperature regime is optimum for all collections of this widely-distributed native species, a point also stressed by Springfield (1970). However, Springfield reported that 5 of 8 sources tested germinated better at 58°F (14.4°C) than at 42°F (5.6°C) or 77°F (25°C).

Springfield (1970) reported that fourwing saltbush seed has an afterripening requirement of up to 10 months. No reliable method for circumventing the afterripening requirement has been found.

Because of this afterripening requirement and the fact that a single temperature regime will not be optimum for all seed lots, post-germination testing for dormant seed is necessary. Results from seven AOSA laboratories which participated in a referee germination test showed no significant differences among laboratories in either percent germination or percent germination plus percent dormant seed.

A manuscript draft containing more detailed supporting evidence was reviewed by the Rules Committee and is available from Susan E. Meyer.

LITERATURE CITED

Springfield, H.W. 1970. Germination and establishment of fourwing saltbush in the southwest. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station Research paper RM-55.

SUBMITTED BY

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4. PROPOSAL

Addition of Ceratoides lanata--winterfat to the Rules

PROPOSED RULE

1) Include in Table 1 (Weights for working samples, TREE and SHRUB SEEDS) the following:

Kind of seed	Minimum weight for purity analysis	Approximate number of seeds per gram	Approximate number of seeds per ounce
	Grams	Number	Number
Ceratoides lanata (Pursh) J.T. Howell winterfat	12	213	6040

2) Include in Table 5 (Methods of testing for laboratory germination, TREE and SHRUB SEEDS) the following:

Kind of seed	Substrata	Temperature °C	Test duration days	Additional directions
Ceratoides lanata winterfat	P, T	15	14	For fresh lots, Prechill 14 days at 5°C and see footnote b.

[b]T.Z. tetrazolium: See section 4.9k(2).

3) Section 12. Tree and Shrubs of APPENDIX 1. Seedling Descriptions shall be used for normal-abnormal classifications.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

Determining seed quality of winterfat is difficult. A member of the chenopod family, the winterfat seed unit is a dry, indehiscent one-seeded fruit, the bracts of which are covered with fine silky hairs up to 7mm in length. Stems, leaves and other inert material become embedded in these hairs, decreasing the percent pure seed found in samples submitted for testing and substantially increasing the time required to perform a purity analysis for this species. Furthermore, the hairs on winterfat bracts keep small, unfilled fruits (approximately 1/4 the weight of larger fruits) matted together with larger ones, making mechanical separation of large winterfat fruits from small ones impossible. In 9 winterfat samples examined as many as 32% of the utricles were <3mm in length; these were never filled.

Requiring that the seed be removed from its enclosing bracts prior to laboratory testing would solve many of the difficulties for the analyst, and has recently been recommended for this species (Belcher, 1985). However, Booth (1984) and Booth and Schuman (1983) have provided much evidence that winterfat seeds should not be removed from the bracts prior to field sowing. For example, 25% of mechanically threshed seed they examined had received damage to the radicle apex, leading to a loss of geotropic response of the radicle as well as a decline in seedling vigor. Considering only threshed seeds as pure seed would result in excessively time consuming purity analyses for this species, because samples submitted for laboratory testing have seeds unseparated from the bracts.

In the past, many analysts have selected large (filled) winterfat fruits for inclusion in germination and tetrazolium staining tests. However, the subjective nature of such selection greatly increases the probability of drawing different conclusions regarding the quality of seeds from the same source. To obtain reproducible purity analysis and germination test results for winterfat, small unfilled utricles are to be dealt with as presently specified in Section 2.7 which includes as pure seed the following:

a. Immature or shriveled seeds
f. Intact fruits, whether or not they contain a seed, of families in which the seed unit is a dry, indehiscent one-seeded fruit.

Five hundred winterfat fruits (regardless of size) from each of seven samples were weighed and used to determine the approximate seed weight listed above.

Winterfat seeds have been shown to germinate readily over a wide range of temperatures, including constant 15°C (Springfield 1972a, Detorri et al. 1984). This temperature is recommended due to reduced mold growth as compared to higher temperatures.

A germination test including 400 seeds from each of seven samples showed that 14 days is a suitable test duration.

The following range of values was obtained from a referee sample sent to seven AOSA seed testing laboratories:

Pure seed (from purity analysis)	59-71%
Percent normal germination	5-17%
Percent abnormal germination	0-3%

Most winterfat seeds have an afterripening requirement of about 2 months (Hilton, 1941; Springfield, 1972b). Prechilling at 5°C for 14 days increased germination in two fresh lots, but did not completely circumvent the post-harvest afterripening requirement. A tetrazolium test (in addition to prechilling) is therefore recommended for determining viability of fresh lots.

A manuscript draft containing more detailed supporting evidence was reviewed by the Rules Committee and is available from Phil S. Allen.

LITERATURE CITED

Belcher, E., ed. 1985. Handbook on seeds of browse-shrubs and forbs. U.S.D.A. Forest Service, Southern Region, Technical publication R8-TP8.

Booth, D.T. 1984. Threshing damage to radicle apex affects geotropic response of winterfat. J. Range Manage. 37:222-225.

Booth, D.T. and G.E. Schuman. 1983. Seedbed ecology of winterfat: fruits versus threshed seeds. J. Range Manage. 36:387-390.

Detorri, M.L., J.R. Balliette, J.A. Young, and R.A. Evans. 1984. Temperature profiles for germination of two species of winterfat. J. Range Manage. 29:320-321.

Hilton, H. 1941. Effects of certain micro-ecological factors on the germinability and early development of Eurotia lanata. Northwest Science 15:86-92.

Springfield, H.W. 1970. Emergence and survival of winterfat seedlings from four planting depths. U.S.D.A. Forest Service Research Note RM-162.

Springfield, H.W. 1972a. Optimum temperatures for germination of winterfat. J. Range Manage. 25:69-70.

Springfield, H.W. 1972b. Winterfat seeds undergo after-ripening. J. Range Manage. 25:479-80.

SUBMITTED BY

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5. PROPOSAL

Addition of Elymus cinereus--basin wildrye to the Rules

PROPOSED RULE

1) Include in Table 1 (Weights for working samples, AGRICULTURAL SEEDS) the following:

Kind of seed	Minimum weight for purity analysis	Minimum weight for noxious-weed seed examination	Approximate number of seeds per gram	Approximate number of seeds per ounce
	Grams	Grams	Number	Number
Elymus cinereus Scribner & Merrill basin wildrye	8	80	317	9000

2) Include in Table 3 (Methods of testing for laboratory germination, AGRICULTURAL SEEDS) the following:

Kind of seed	Substrata (See Sec. 4.9-a-b)	Temperature °C (See Sec. 4.9-c)	First count days (See Sec. 4.9-d)	Final count days
Elymus cinereus basin wildrye	P	15-25	10	21[d]

[d]Determine viability of ungerminated seeds; see section 4.2e and 4.9k.

3) Section 6e (Other grasses) of APPENDIX 1. Seedling Descriptions shall be used for normal and abnormal classifications.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

1) The average weight of two hundred-fifty seeds from each of seven samples was used to determine the working weights listed above.

2) Young and Evans (1981) and Evans and Young (1983) showed that optimum temperatures for germination of basin wildrye seeds range from 15 to 25°C. At a temperature of 15-25°C (alternating), these authors reported that 66% of the total germination occurred during the first week of incubation and 34% occurred during the second week. Twenty-one days is recommended to allow sufficient seedling growth for normal-abnormal classifications, and because lots containing dormant seeds showed a slower germination rate in our experiments.

In a factorially-arranged experiment involving two light treatments (light vs. dark), two temperatures (15° constant versus 15-25°C alternating), and seven seed samples, seeds from five of seven samples showed no difference due to light or temperature, with 2% or less of the seeds found dormant (by tetrazolium staining) after 21 days. Two fresh samples, however, showed much higher emergence at 15-25°C in the dark, and many seeds were dormant after 21 days (from 8% to 27%).

Results of a referee sample sent to six AOSA seed testing laboratories showed that similar findings regarding seed quality are obtainable if viability of ungerminated seed is determined at the conclusion of the germination test.

A manuscript draft containing more detailed supporting evidence was reviewed by the Rules Committee and is available from Phil S. Allen.

LITERATURE CITED

Evans, R.A. and J.A. Young. 1983. 'Magnar' basin wildrye--germination in relation to temperature. J. Range Manage. 36:395-398.

Young, J.A. and R.A. Evans. 1981. Germination of Great Basin wildrye seeds collected from native stands. Agronomy Journal 73:917-920.

SUBMITTED BY

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6. PROPOSAL

Addition of Kochia prostrata--forage kochia to the Rules

PROPOSED RULE

1) Under section 2.7 (Kind or cultivar considered pure seed), the following shall be added as pure seed:

j. Seeds of Kochia prostrata which are retained on a 1mm opening square-holed sieve.

2) Under section 2.10a (Inert matter), the following shall be added as inert matter:

(10) Seeds of Kochia prostrata which pass through a 1mm opening square-holed sieve.

3) Include in Table 1 (Weights for working samples, AGRICULTURAL SEEDS) the following:

Kind of seed	Minimum weight for purity analysis	Minimum weight for noxious-weed seed examination	Approximate number of seeds per gram	Approximate number of seeds per ounce
	Grams	Grams	Number	Number
Kochia prostrata L. forage kochia	2	20	1070	30,300

4) Include in Table 3 (Methods of testing for laboratory germination, AGRICULTURAL SEEDS) the following:

Kind of seed	Substrata (See Sec. 4.9-a-b)	Temperature °C.(See Sec. 4.9-c)	First count days (See Sec. 4.9-d)	Final count days	ADDITIONAL DIRECTIONS Fresh and dormant seed
Kochia prostrata forage kochia	P	20	4	14	See footnote d.

[d]Determine viability of ungerminated seeds; see section 4.2e and 4.9k.

5) Include Kochia prostrata in the list of species under Section 1. Chenopodiaceae, Goosefoot family of APPENDIX 1. Seedling Descriptions for normal-abnormal classifications.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

Kochia prostrata is a member of the family Chenopodiaceae. The seed unit consists of a coiled embryonic plant borne in a fragile utricle (Young et al. 1981).

Seed Samples of Kochia prostrata submitted for laboratory testing typically contain a large amount of inert material. While large seeds (utricles) of this species are easy to distinguish by the analyst, small ones (less than 1mm in diameter) require substantial effort to separate from inert material.

Unusually small utricles may be separated from larger ones by passage through a 1mm opening square-holed sieve. This is partially due to the fact that larger utricles usually have star-shaped wings protruding horizontally from the obtusely shaped utricle, while smaller ones are nearly spherical and always lack such wings. Weighing 100 utricles which passed through a 1mm square-holed sieve and 100 which remained on the sieve showed that the average weight of the small utricles was only one sixth that of larger ones. When small utricles were examined under a light microscope no embryonic growth could be detected, indicating that the seeds in question are largely ungerminable. In a germination test involving 100 utricles which passed through a 1mm opening square-holed sieve from each of four sources, 0.25% of the seeds germinated.

1) The average weight of five hundred seeds from each of four samples was used to derermine the working weights listed above. Only seeds remaining on a 1mm opening square-holed sieve were included in this determination.

2) Young et al. (1981) reported that optimum germination temperatures for Kochia prostrata centered around constant 20°C. These authors also reported that 50% of the seeds had germinated after 4 days at this temperature.

Seeds of Kochia prostrata have been reported to have a post-harvest dormancy of four to six months (Balyan, 1972). No successful laboratory procedures for circumventing this dormancy condition have been reported. For this reason, determination of viability of ungerminated seeds for fresh lots is recommended.

When a referee sample was tested by seven AOSA laboratories, five of the laboratories reported similar germination test results.

A manuscript draft containing more detailed supporting evidence was reviewed by the Rules Committee and is available from Phil S. Allen.

LITERATURE CITED

Balyan, G.A. 1972. Prostrate summer cypress and its culture in Kirghizia. (Transl. from Russian) 261 p. Al Ahram Cen. Sci. Transl., Nat. Tech. Information Ser. TT77-59026.

Young, J.A., R.A. Evans, R. Stevens, and R.L. Everett. 1981. Germination of Kochia prostrata seed. Agronomy Journal 73:957-961.

SUBMITTED BY

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7. PROPOSAL

Addition of Purshia tridentata--antelope bitterbrush to the Rules

PROPOSED RULE

1) Add the following to the end of the last sentence of f in section 2.7 (Kind or cultivar considered pure seed):

and to section 2.10a(11) for classification of the pericarp (fruit wall) in Purshia tridentata.

2) Add the following under section 2.10a (Inert matter):

(11) The thin pericarp (fruit wall), if present on seeds of Purshia tridentata.

3) Include in Table 1 (Weights for working samples, TREE and SHRUB SEEDS) the following:

Kind of seed	Minimum weight for purity analysis	Approximate number of seeds per gram	Approximate number of seeds per ounce
	Grams	Number	Number
Purshia tridentata (Pursh) DeCandolle antelope bitterbrush	70	37	1050

4) Include in Table 5 (Methods of testing for laboratory germination, TREE and SHRUB SEEDS) the following:

Kind of seed	Substrata	Temperature °C	Test duration days	Additional directions
Purshia tridentata antelope bitterbrush	B	15	7	Presoak for 24 hours at 22°C followed by a 4 week prechill at 2°C, or use TZ.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

1) Two hundred seeds from each of six samples were weighed to determine the approximate seed weight for this species.

2) Antelope bitterbrush seeds are characterized by high dormancy. While chemical treatments have enhanced germination in some instances (Young and Evans, 1981), moist prechilling is the only practical laboratory technique for overcoming dormancy in this species.

Young and Evans (1981) reported that prechilling antelope bitterbrush seeds for either 2 weeks at 5°C or 4 weeks at 2°C effectively satisfied the stratification requirement for this species.

We tested six sources of antelope bitterbrush seeds using both of these prechill treatments prior to germination at 15°C constant temperature in the dark. The 4 week-2°C prechill resulted in 65% greater germination than 2 week-5°C prechill. Adequately prechilled seeds germinated within 7 days.

In the same experiment, a 24-hour soak in standing water prior to prechilling increased germination (an average of 28%) in all six sources. In addition, the presoak significantly reduced the number of seeds which became covered with fungi during the prechill treatment. Serious pathogen problems during laboratory germination tests with antelope bitterbrush seeds have been reported (Harper, 1970; Young and Evans, 1976). A 24-hour soak in running water decreased germination in four of the six sources.

A constant temperature of 15°C after prechilling has been reported as optimum by Young and Evans (1977). In our experiment, germination at 15°C averaged 89% of viable seed as determined by a preliminary tetrazolium staining test on seeds from each source.

A tetrazolium test for viability may be substituted for the somewhat lengthy germination test. The two methods give comparable results.

A manuscript draft containing more detailed supporting evidence was reviewed by the Rules Committee and is available from Susan E. Meyer.

Refer to diagram below for the labeled parts of the achene for this species. These structures have been incorrectly identified in some publications.

LITERATURE CITED

Harper, L.W. 1970. The use of thiourea for laboratory germination of antelope bitterbrush seed. Proc. Assoc. Off. Seed Anal. 60:127-131.

Young, J.A. and R.A. Evans. 1976. Stratification of bitterbrush seed. J. Range Manage. 29:421-425.

Young, J.A. and R.A. Evans. 1977. Bitterbrush germination with constant and alternating temperatures. J. Range Manage. 30:30-32.

Young, J.A. and R.A. Evans. 1981. Germination of seeds of antelope bitterbrush, desert bitterbrush, and cliff rose. U.S.D.A. Science and Education Administation. Agricultural Research Results ARR-W-17.

SUBMITTED BY

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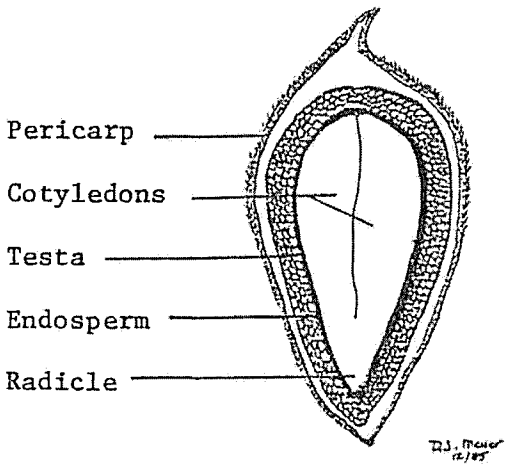
Achene (dry, indehiscent one-seeded fruit) of Purshia tridentata :



8. PROPOSAL

Change in definition of other crop seed in section 2.8

PRESENT RULE

2.8 Other crop seed.- Seeds of plants grown as crops (other than the kind or cultivar included in the pure seed) shall be considered other crop seeds, unless recognized as weed seeds by laws, regulations, or by general usage. All interpretations and definitions for pure seed in section 2.7 shall also apply in determining whether seeds are other crop or inert matter. Refer to AOSA Handbook No. 25, Uniform Classification of Weed and Crop Seeds.

PROPOSED RULE

2.8 Other crop seed.- Seeds of plants grown as crops (other than the kind(s) and cultivar(s) included in the pure seed) shall be considered other crop seeds, unless recognized as weed seeds by laws, regulations, or by general usage. Refer to the current edition of AOSA Contribution No. 25 to the Handbook on Seed Testing: Uniform Classification of Weed and Crop Seeds. All interpretations and definitions for pure seed in section 2.7 shall also apply in determining whether seeds are other crop or inert matter with the following two exceptions which may be applied as acceptable alternatives:

a. Uniform Blowing Procedure in section 2.11 for kinds listed in section 2.7g(2) may be disregarded. If disregarded, all seed units (as defined in section 2.6) for these kinds found in the working sample shall be manually separated into pure seed and inert matter. Only units containing at least one caryopsis with some degree of endosperm development which can be detected either by slight pressure or by examination over light are considered other crop.

b. Multiple Unit procedures in section 2.12 for kinds listed in section 2.7g(3) may be disregarded. If disregarded, all multiple units and single units (as defined in 2.12) for these kinds found in the working sample shall be manually separated into single florets. Each floret containing a caryopsis with some degree of endosperm development, which can be detected either by slight pressure or examination over light, is considered other crop. Empty florets and glumes, if present, are considered inert matter. Refer to section 2.10a(4).

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

Methods prescribed for kinds in section 2.12 (Multiple Unit procedures) are mandatory and do not allow for hand separation to determine pure seed and inert matter under any circumstances (not even for one seed present in the working sample). However, there are many instances in which it is much easier and quicker to remove empty florets and/or attached glumes and determine pure seed versus inert matter by the hand method than to follow the Multiple Unit procedures. When seeds of these kinds are present in samples to the extent of 5% or less of the whole, analysts should be given the option of determining if these seeds are considered other crop or inert matter by this alternate method.

Methods prescribed for kinds in section 2.11 (Uniform Blowing Procedure) are mandatory and do not allow for hand separation to determine pure seed and inert matter under any circumstances (not even for one seed present in the working sample). As with the above, there are many instances in which it is much easier and quicker to evaluate seed units using the hand method. When seeds of these kinds are present in samples to the extent of 5% or less of the whole, analysts should be given the option of determining if these seeds are considered other crop or inert matter by this alternate method. Calibration samples used in the Uniform Blowing procedure were developed to achieve results similar to the hand method. The percentage of pure seed and inert matter obtained by using either method on a sample should be comparable.

The first sentence of this section has been changed slightly to incorporate an interpretation of other crop seed issued by the Rules Committee and approved by the Executive Board at their June 1981 meeting in Orlando, Florida (see J. Seed Technol. 6(3):64).

SUBMITTED BY

AOSA Uniformity Subcommittee
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9. PROPOSAL

Addition of Paspalum to section 2.6b(3) of the Rules

PRESENT RULE

2.6 Seed unit.-

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

PROPOSED RULE

2.6 Seed unit.-

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

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

Entire spikelets as well as florets and caryopses are structures usually regarded as seed in planting practices and in commercial channels for Paspalum spp. If the proposed change for section 2.8 is adopted, the seed unit for Paspalum needs to be defined in section 2.6.

SUBMITTED BY

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10. PROPOSAL

Calculation of number of seeds in the sample.

PROPOSED RULE

1) Reletter item c (Separation of similar kinds or cultivars) to d in section 2.5 (The purity analysis).

2) Add as new 2.5c: Calculation of number of seeds in the sample.—
(A) When converting numbers of seeds found in the working sample to the number of seeds per pound, the following formula shall be used:

$$\frac{\text{450 grams X number of seeds found}}{\text{weight of working sample (grams)}} = \text{number of seeds per pound}$$

Example 1. In a 50-gram examination of alfalfa seed, 12 dodder seeds were found.

Substituting we have: $\frac{450 \times 12}{50} = 108$ seeds per pound

This same formula can also be used to convert the number of seeds per pound to the number found for any desired sample weight.

Example 2. Sorghum seed is labeled to show 12 Johnsongrass seeds per pound and the number found in a 300-gram examination is desired.

Substituting we have: $\frac{450 \times \text{number of seeds found}}{300} = 12$

Thus, number of seeds found $= \frac{300 \times 12}{450} = 8$ seeds (in 300 grams)

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

$$\frac{\text{28 grams X number of seeds found}}{\text{weight of working sample (grams)}} = \text{number of seeds per ounce}$$

Example 3. In a 25-gram sample of bentgrass seed, 7 oxeye daisy seeds were found.

Substituting we have: $\frac{28 \times 7}{25} = 7.84 =$ 8 seeds per ounce

This same formula can also be used to convert the number of seeds per ounce to the number found for any desired sample weight.

Example 4. White clover seed is labeled to show 8 seeds of curled dock per ounce and the number found in a 35-gram examination is desired.

Substituting we have: $\frac{28 \times \text{number of seeds found}}{35} = 8$

Thus, number of seeds found $= \frac{35 \times 8}{28} = 10$ seeds (in 35 grams)

When using any of the above formulas, the weight of the working sample shall be rounded to the nearest whole number. The calculated number of seeds shall also be rounded to the nearest whole number (i.e., 24.5 is rounded up to 25, while 24.4 is rounded down to 24).

3) Delete APPENDIX 2. CONVERSION OF SAMPLE WEIGHTS from the Rules.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

There is a definite need to make this proposed addition to section 2.5 (The purity analysis) and consolidate APPENDIX 2. in the Rules within this new 2.5c. Currently there is little or no standardization between laboratories regarding the conversion of numbers of seeds found in the working sample (purity and/or noxious weed seed examination) to the number of seeds reported per pound or per ounce. Seed trade contracts are often based on maximum numbers of seeds as are seed certification standards. If conversion procedures are not standardized, differences in numbers reported by seed laboratories can cause confusion.

Some people may wish to use 454 grams instead of 450 grams in Example 1 and Example 2 of this proposal. However, much of the seed trade and certification agencies already have existing standards that are based on 450-grams to a pound.

We are aware of various "gram charts" for converting numbers of seeds in a sample currently in use by some laboratories. Some of these charts show numbers which are rounded off significantly for various reasons. Thus, laboratories are currently reporting different numbers which is confusing to the seed industry.

Instead of proposing several lengthy gram charts for insertion into the Rules, we are offering formulas (with examples) for calculating the number of seeds per pound or per ounce. These formulas will standardize calculating and reporting procedures.

SUBMITTED BY

On behalf of Oregon Seed Analysts:

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11. PROPOSAL

Rules for Testing Coated Seeds.

PRESENT RULE

(Present rule is tentative only. For ease in comparing the tentative rule and the proposed rule, proposed changes are included here in italics. Dashed lines indicate wording being changed or eliminated from the tentative rule.)

2.13 Coated seed purity procedures

a. Definition: Coated seed is a seed unit covered with any substance which changes the size, shape, or weight of the original seed. Seeds coated with ingredients such as, but not limited to, rhizobia, dyes, and pesticides are excluded.

(1) *Uniformly coated seed.*
That unit which is covered to a specific size and shape and is free flowing for precision planting. Kinds involved include, but are not limited to, vegetable, flower, tobacco, and sugar beet seeds.

(2) *Non-uniformly coated seed.*
That unit which is partially or wholly covered to add weight or to serve as a carrier. Kinds involved include, but are not limited to, legumes, grasses, and other field crops.

b. Sampling:

(1) *Size of submitted sample:* The minimum size for samples of coated units to be submitted for a pure coated unit test (*purity analysis*) shall be that of 7500 units. The minimum size for samples of coated units to be submitted for noxious weed seed examination shall be that of 30,000 units. When only a germination test is requested, a minimum of 1000 units shall be submitted.

(2) *Forwarding and receipt of official samples:* Samples of coated seed shall be forwarded in firmly packed crush-proof and moistureproof containers.

c. Size of working sample:

(1) *Single components:* (*kinds*) Due to variation in weight of coating materials, the size or weight of the working sample shall be determined separately for each lot. The weight of the working sample shall be determined by weighing 100 completely coated units and calculating the weight of 2500 coated units for the pure (*purity analysis*) coated units test and 30,000 (*25,000*) coated units for the noxious weed seed determination (*examination*) test.

(2) *Mixtures:* The working weight shall be determined in the following manner:

(a) Calculate the weight of the working sample to be used for the mixture under consideration as though the sample were not coated by following sections 2.3d (1) or (2).

(b) Determine the amount of coating material on 100 coated units by weighing the coated units. Then use methods described in section 2.13 *f.* and *g. to remove coating material.* (3), (4), and (5). Calculate the percentage of coating material using the following formulas:

Wt. of CMI = Wt. of 100 c.u. (*coating material*, *coated units*) − Wt. of 100 de-coated u. (*units*)

% of CMI = Wt. of CMI ÷ Wt. of 100 c.u. × 100%.

(c) The weight of the working sample shall be the product of the weight calculated in (a) multiplied by 100% divided by 100% minus the percentage of coating material calculated in (b).

Example:
Where the weight calculated in (a) = 5 grams and the percentage of coating material calculated in (b) = 30%:

$$\frac{5 \text{ grams} \times 100\%}{(100\% - 30\%)} =$$

$$\frac{5 \text{ grams} \times 100\%}{70\%} =$$

$$\frac{5}{.7} =$$

7.1 grams

To determine that this formula is accurate (provides a working weight of coated seed sufficient to provide the weight of seed that would be tested if the seed were not coated), multiply the working weight by the percentage of coating material and subtract this product from the working weight:

7.1 grams × 30% = 2.13 grams of coating (round off to 2.1 g)

7.1 minus 2.1 = 5 grams of seed

d. Obtaining the working sample:

Methods described in Section 2.2 shall be used, with the following precautions: Mechanical dividers may be used only if the distance of fall is less than 25cm. and does not damage the coated units.

Coated seed shall be divided by placing the sample in a pile and thoroughly mixing. Divide the pile into halves until a sample of the desired weight remains. See section 2.2. The distance of fall should not exceed 25 cm. to avoid damage to the coated units; therefore, a mechanical divider should not be used.

e. The purity analysis of uniformly coated seed:

(1) *Separation of component parts:* The working sample shall be weighed in grams to four significant figures and shall be separated into four parts, or five parts if determination of percentage of coating material is required:

i. pure coated units;
ii. uncoated crop seed (including the kind under consideration)
iii. inert matter;
iv. uncoated weed seed; and, if required,
v. coating material inert (CMI).

(2) *Pure coated units shall include:*

i. entire coated units regardless of whether or not they contain a seed;
ii. broken and damaged coated units in which more than half the surface of the seed is covered by coating material, except when it can be seen that, either the seed is not of the species stated by the sender, or there is no seed present.

(3) *Uncoated crop seed shall include:*

i. free seeds of any crop species, refer to sections 2.7 and 2.8;
ii. broken coated units containing a crop seed that is recognizably

not of the species stated by the sender;

iii. broken coated units of the species stated when the coating material covers half or less of the surface of the seed.

(4) *Inert matter shall include:*

i. loose coating material;

ii. broken coated units in which it is obvious there is no seed;

iii. any other material defined as inert matter in section 2.10.

(5) *Uncoated weed seed shall include:*

i. free seeds of any weed species, refer to section 2.9;

ii. broken coated units containing a weed seed.

(6) Coating material inert (CMI) shall be the weight of the coating material washed off if de-coating the sample is necessary. Refer to section 2.13 g. (5). Loose coating material shall not be included in this weight. refer to 2.13 g. (2).

f. The purity analysis on non-uniformly coated seed: *de-coated to be performed upon request or if necessary because the sample is a mixture:*

(1) The working sample shall be sieved to remove any non-adhering coating material from the coated units.

(2) *Separation of component parts:* Weigh in grams to four significant figures and separate into four parts, or five parts if determination of percentage of coating material is required:

i. kind of cultivar to be considered pure seed;

ii. other crop seed;

iii. inert matter;

iv. weed seed; and, if required,

v. coating material inert (CMI).

(3) Remove the coating material from the coated units, dry the seed, and calculate the amount of coating material. Refer to section 2.13 g. (3), (4), and (5).

(4) Separate the de-coated seed into component parts following sections 2.7 through 2.10. Sections 2.7 g. (2) and (3), 2.11 and 2.12 shall not be followed. Weigh each component and add the weight of the non-adhering coating material, determined in section 2.13 f. (1), to the inert matter component.

(5) In calculating the percentages of the components, the coating material may be reported as required.

g. Procedure to be used when the weight of the coating material or a purity analysis on de-coated seed is required: *in grams to four significant figures*

(1) Obtain the working sample as in sections 2.13 c. (1) and (2), and weigh.

(2) Any loose coating material shall be sieved, weighed, and added to the inert matter. *included with the inert matter component.*

(3) Remove the coating material from the seed by shaking in a fine sieve immersed in water or in a solvent. A seive of 1.00 mm above a sieve of 0.5mm is recommended (ISTA Rules). Or use the method of removing coating material whicn involves washing coated seed with a dilute sodium hydroxide (NaOH) solution (pH8-8.4) and vacuum dry the seed after washing with methyl alcohol. Refer to Journal of Seed Technology, Vol. 2, No. 1, pages 81-85.

washing with water or other solvents such as, but not limited to, dilute sodium hydroxide. Use of fine mesh sieves are recommended for this procedure, and stirring or shaking the coated units may be necessary to obtain de-coated seed.

(4) Spread on blotters or filter paper in a shallow container. *Air* Dry overnight. *at room temperature.*

(5) *Separation of component parts:*

i. kind or cultivar considered pure seed;
ii. other crop seed;
iii. inert matter;
iv. weed seed;
v. coating material.

The de-coated seed shall be separated into the first four components in accordance with Sections 2.7 through 2.10. Sections 2.11 and 2.12 shall not be followed. The weight of the coating material component is determined by subtracting the sum of the weights of the other four components from the original weight of the working sample. Calculate percentages of all five components based on the original weight of the working sample.

(5) Separated the de-coated seed into component parts. Refer to sections 2.7 through 2.10. Sections 2.11 and 2.12 shall not be followed. Weigh each component and calculate percentages on the total weight of de-coated seed. If the coating material percent is required, the CMI is the difference between the original weight of the working sample and the sum of the weights of the other four components.

g. h. Noxious weed seeds: *25,000*
A noxious weed seed examination shall be made by examining approximately 30,000 units which have been de-coated.

h. i. Identification and cultivar determination:
Verification of kind of seed under consideration shall be made on 100 coated units taken from the pure coated unit component of the purity separation. Before examination, the coating material shall be removed by washing or other appropriate method. The name and number of each kind found shall be reported. For cultivar determination, a minimum of 400 coated units shall be examined as above.

To determine the kind of seed under consideration, 100 coated units from the pure coated unit portion of the purity test shall be washed and identified. For cultivar determination a minimum of 400 coated units shall be washed and examined.

4.8 Special procedures and alternate methods for germination

k. Coated Seed:

(1) Germination tests on coated seed units and on de-coated seed shall be tested in accordance with section 4.10. *Kinds for which soaking or washing is specified in Section 4.8 shall not be soaked or washed in the case of coated seed.*

(a) Coated seed units from uniformly coated seed, from non-uniformly coated seed units of single component samples, and non-uniformly color coded seed units in mixtures shall be placed on the substratum in the conditon in which they are received without rinsing, soaking, or any other pretreatment.

(b) Non-uniformly coated seed units in mixtures, such as small legumes, which have not been color coded shall have the coating material removed in such a manner as to not affect the germination capacity of the seeds. Plant the same day the units are de-coated.

(b) *Coated seed units in mixtures which are color coded or can otherwise be separated by kinds shall be germinated as separate kinds without removing the coating material.*

(c) *Coated seed units in mixtures which cannot be separated by kinds without removing the coating material shall have the coating removed in a manner that will not affect the germination capacity of the seeds. The de-coated seeds shall be planted as separate kinds on the same day the coating material is removed.*

(d) *On request or as a comparison, germination may be made on de-coated seed. Remove the coating material in a manner that will not affect the germination of the seeds and plant the same day.*

(2) The moisture level of the substratum is important. It may depend on the water-absorbing capacity of the coating material. A retest may be necessary before satisfactory germination of the sample is achieved.

(3) Phytotoxic symptoms may be evident when germinating coated seeds in paper substrata. In such cases a comparative test or retest in sand or soil may be necessary.

PROPOSED RULE

2.13 Coated seed purity procedures

a. Definition: Coated seed is a seed unit covered with any substance which changes the size, shape, or weight of the original seed. Seeds coated with ingredients such as, but not limited to, rhizobia, dyes, and pesticides are excluded.

b. Sampling:

(1) Size of submitted sample: The minimum size for samples of coated units to be submitted for a purity analysis shall be that of 7500 units. The minimum size for samples of coated units to be submitted for noxious-weed seed examination shall be that of 30,000 units. When only a germination test is requested, a minimum of 1000 units shall be submitted.

(2) Forwarding and receipt of official samples: Samples of coated seed shall be forwarded in firmly packed crush-proof and moisture-proof containers.

c. Size of working sample:

(1) Single kinds: Due to variation in weight of coating materials, the size or weight of the working sample shall be determined separately for each lot. The weight of the working sample shall be determined by weighing 100 completely coated units and calculating the weight of 2500 coated units for the purity analysis and 25,000 coated units for the noxious-weed seed examination.

(2) Mixtures: The working weight shall be determined in the following manner:

(a) Calculate the weight of the working sample to be used for the mixture under consideration as though the sample were not coated by following sections 2.3d(1) or (2).

(b) Determine the amount of coating material on 100 coated units by weighing the coated units. Then use methods described in section 2.13 f. (3) and (4) to remove coating material. Calculate the percentage of coating material using the following formulas:

Wt. of coating material = Wt. of 100 coated units - Wt. of 100 de-coated units.

% of coating material = Wt. of coating material ÷ Wt. of 100 coated units x 100%.

(c) The weight of the working sample shall be the product of the weight calculated in (a) multiplied by 100%, divided by 100% minus the percentage of coating material calculated in (b).
Example:
Where the weight calculated in (a) = 5 grams and the percentage of coating material calculated in (b) = 30%:

$$\frac{5 \text{ grams} \times 100\%}{(100\% - 30\%)} =$$

$$\frac{5 \text{ grams} \times 100\%}{70\%} =$$

$$\frac{5}{0.7} =$$

7.1 grams

d. Obtaining the working sample:
Methods described in Section 2.2 shall be used, with the following precautions: Mechanical dividers may be used only if the distance of fall is less than 25 cm. and does not damage the coated units.

e. The purity analysis of coated seed:
(1) Separation of component parts: The working sample shall be weighed in grams to four significant figures and shall be separated into four parts:
i. pure coated units
ii. uncoated crop seed (including the kind under consideration)
iii. inert matter
iv. uncoated weed seed
(2) Pure coated units shall include:
i. entire coated units regardless of whether or not they contain a seed
ii. broken and damaged coated units in which more than half the surface of the seed is covered by coating material, except when it can be seen that, either the seed is not of the species stated by the sender, or there is no seed present.
(3) Uncoated crop seed shall include:
i. free seeds of any crop species; refer to sections 2.7 and 2.8
ii. broken coated units containing a crop seed that is recognizably not of the species stated by the sender
iii. broken coated units of the species stated when the coating material covers half or less of the surface of the seed.
(4) Inert matter shall include:
i. loose coating material
ii. broken coated units in which it is obvious there is no seed
iii. any other material defined as inert matter in section 2.10
(5) Uncoated weed seed shall include:
i. free seeds of any weed species; refer to section 2.9
ii. broken coated units containing a weed seed

f. The purity analysis on de-coated seed, to be performed upon request or if necessary because the sample is a mixture:
   (1) Obtain the working sample as in sections 2.13c.(1) and (2), and weigh in grams to four significant figures.
   (2) Any loose coating material shall be sieved, weighed, and included with the inert matter component.
   (3) Remove the coating material from the seed by washing with water or other solvents such as, but not limited to, dilute sodium hydroxide. Use of fine mesh sieves are recommended for this procedure, and stirring or shaking the coated units may be necessary to obtain de-coated seed.
   (4) Spread on blotters or filter paper in a shallow container. Air dry overnight at room temperature.
   (5) Separation of component parts:
      i. kind or cultivar considered pure seed
      ii. other crop seed
      iii. inert matter
      iv. weed seed
      v. coating material

   The de-coated seed shall be separated into the first four components in accordance with Sections 2.7 through 2.10. Sections 2.11 and 2.12 shall not be followed. The weight of the coating material component is determined by subtracting the sum of the weights of the other four components from the original weight of the working sample. Calculate percentages of all five components based on the original weight of the working sample.

g. Noxious weed seeds:
   A noxious-weed seed examination shall be made by examining approximately 25,000 units which have been de-coated.

h. Identification and cultivar determination:
   Verification of kind of seed under consideration shall be made on 100 coated units taken from the pure coated unit component of the purity separation. Before examination, the coating material shall be removed by washing or other appropriate method. The name and number of each kind found shall be reported. For cultivar determination, a minimum of 400 coated units shall be examined as above.

4.8 Special procedures and alternate methods for germination

k. Coated Seed:
   (1) Germination tests on coated seed units and on de-coated seed shall be conducted in accordance with methods in section 4.10. Kinds for which soaking or washing is specified in Section 4.8 shall not be soaked or washed in the case of coated seed.
      (a) Coated seed units shall be placed on the substratum in the condition in which they are received without rinsing, soaking, or any other pretreatment.
      (b) Coated seed units in mixtures which are color coded or can otherwise be separated by kinds shall be germinated as separate kinds without removing the coating material.
      (c) Coated seed units in mixtures which cannot be separated by kinds without removing the coating material shall have the coating removed in a manner that will not affect the germination capacity of the seeds. The de-coated seeds shall be planted as separate kinds on the same day the coating material is removed.

(d) On request or as a comparison, germination may be made on de-coated seed. Remove the coating material in a manner that will not affect the germination of the seeds and plant the same day.

(2) The moisture level of the substratum is important. It may depend on the water-absorbing capacity of the coating material. A retest may be necessary before satisfactory germination of the sample is achieved.

(3) Phytotoxic symptoms may be evident when germinating coated seeds in paper substrata. In such cases a comparative test or retest in sand or soil may be necessary.

SUPPORTING EVIDENCE AND REASONS FOR PROPOSED CHANGE

A survey concerning rules for testing coated seed was sent to AOSA member laboratories in September 1985 by David Svik, supervisor of the Nebraska State Seed Laboratory. SCST member laboratories also had an opportunity to complete the survey, via the SCST Newsletter. Forty-three laboratories responded to the survey, with 35 indicating that they test coated seed. Several laboratories suggested the following changes in the tentative rule:

1. simplify the purity procedure;
2. reduce the noxious-weed seed examination from 30,000 coated units to 25,000;
3. allow air-drying after de-coating the seed.

The following changes are incorporated into the proposed rule:

1. The arbitrary distinction between uniformly and non-uniformly coated seed is eliminated, since the seed would not be labeled as such.
2. Regardless of type of coating, purity tests may be made on either coated or de-coated seed.
3. Sections 2.13.f. and g. of the tentative rule are combined into one section which prescribes methods for purity analysis of de-coated seed.
4. Air-drying is allowed for de-coated seed.
5. Size of working sample for noxious-weed seed examination is reduced to 25,000 coated units.
6. Editorial changes are made to achieve consistent terminology. For example, the term "CMI" is eliminated and "coating material" is used instead.
7. Mechanical dividers may be used with certain precautions. Note that the distance of fall for typical Gamet and Boerner dividers is more than 25 cm. and so would not meet the requirements for mechanical dividers in the proposed rule.
8. Verification of the kind of seed being tested is clarified as a requirement.
9. Kinds such as beets, which are usually washed prior to a standard germination test, will not be washed or soaked if they are coated.

SUBMITTED BY

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RULE PROPOSAL 12 - 1986

AOSA Rules Committee
Stephen J. Hurst, Chairman

One rule change proposal was received too late to be included with the other proposals that appeared in the February 1986 issue of the AOSA Newsletter. The proposal was sent separately to all AOSA member laboratories by direct mail in late February. It is presented below for the benefit of those individuals and laboratories that were not included in the special mailing. This proposal will be voted on at the Annual Meeting in June. Comments concerning the content or wording of this proposal can be forwarded to the Rules Committee Chairman.

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12. PROPOSAL

Change in seedling descriptions of Section 4 in APPENDIX 1:

4. Cucurbitaceae, Cucurbit family (USDA Handbook 30 pp. 124-125; fig. 34).

Citrullus lanatus var. citroides, citron;
Citrullus lanatus var. lanatus, watermelon;
Cucumis melo, muskmelon or cantaloupe;
Cucumis sativus, cucumber;
Cucurbita spp., squash; and
Cucurbita spp., pumpkin.

PRESENT RULE

Normal seedling
Cotyledons — Two, intact or with only slight decay or injury.
Abnormal seedling
Cotyledons — One or both missing or decayed.

PROPOSED RULE

Normal seedling
Cotyledons — At least one cotyledon fully developed and free of injury or decay, or parts of two cotyledons equal in area to one whole cotyledon.
Abnormal seedling
Cotyledons — Less than one cotyledon fully developed and free of injury or decay, or parts of two cotyledons which do not equal one whole cotyledon in area.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

This proposal is submitted as part of an assignment to me as a member of the A.O.S.A. Seedling Evaluation Committee which is writing a new seedling evaluation handbook. The purpose of the assignment was to determine the appropriateness of the I.S.T.A. rule versus the A.O.S.A. rule on cucurbit cotyledon requirements by comparing relative days from planting to first blossom stage for two experimental groups of plants. I.S.T.A. rules state that 50% of intact cotyledon tissue is required for a seedling to be considered normal. A.O.S.A. rules require two intact cotyledons showing only slight decay or injury.

A research project I conducted showed that days from planting to first blossom stage were not significantly different between control groups and groups which had one half of the cotyledon tissue artificially removed prior to planting. Five species within the cucurbit family (Cucurbitaceae) were tested: pumpkin, squash, cantaloupe, cucumber, and watermelon. Seeds were planted on April 20, 1985. Sixty intact seeds of each species were planted in 10 pots, six seeds to a pot. Sixty seeds with artificially reduced cotyledon area of each species were likewise planted in 10 pots, six seeds to a pot. The artifact seeds were produced by moistening them overnight in paper towels, then cutting off the cotyledons on the end opposite the radicle, effectively reducing the cotyledon tissue by 50%. That amount of tissue is the minimum amount required by the I.S.T.A. rules. All seeds were planted in pots 6 inches in diameter and 7 inches deep. The potting mix was a standard formula of peat, perlite, and sand. The pots were placed in a greenhouse having controlled temperatures of 75°F (day) and 65°F (night). There were 20 pots per species, 100 pots in all. After the seedlings emerged, they were thinned to 5 seedlings per pot. They were watered daily and received a feeding of Hoagland's solution once a week.

Following is a table of the average number of days from planting to flowering for each species and the respective treatments. Only seedlings which survived to flowering stage are included. The number in the inset boxes are the number of seedlings, out of 50, which survived to first flower stage.

	Pumpkin	Squash	Watermelon	Cucumber	Cantaloupe
Whole Cotyledons	47 [48]	64 [48]	55 [42]	50 [48]	50 [47]
Half Cotyledons	48 [50]	63 [42]	55 [36]	50 [50]	51 [43]

The limits of artificially induced defects to seeds used in this project are recognized. However, I would surmise that this type of trauma used on these seeds would be at least equal to most naturally occurring types of damage. Furthermore, the amount of cotyledon tissue removed results in the minimum amount allowed in the "one-half cotyledon" rule of I.S.T.A. In my opinion, the data does support the adoption of the "one-half" cotyledon provision. For most cucurbit crops, once-over harvest is not a routine practice. The crop maturations are rather long, and the small differences in the data shown in the table would probably not significantly affect harvest dates.

SUBMITTED BY
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