RULE PROPOSALS - 1987

AOSA Rules Committee
Stephen J. Hurst, Chairman
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The following proposals for changes in or additions to the AOSA Rules For Testing Seeds have been evaluated and approved by the Rules Committee. These proposals will be voted on by the AOSA membership at their June 1987 business meeting in California.

Please read and review all proposals along with reasons and supporting evidence. Comments concerning content and/or wording of these proposals are welcome and can be forwarded to either the Rules Committee Chairman or Mark Johnson, (5550 NW 55th Avenue, Johnston, Iowa 50131), the SCST liaison representative on the Rules Committee. Your comments will be presented and discussed at the Open Rules Committee meeting in June.

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1. PROPOSAL

Addition to Table 1 of weights for working samples for certain trees and shrubs listed only in Table 5 and revision of footnote a to Table 1

PRESENT STATUS

Table 5 of the Rules contains 35 kinds of trees and shrubs that are not listed in Table 1.

PRESENT RULE

Footnote a to Table 1 states:

> If it is necessary to conduct a noxious-weed seed determination, see section 2.3 for size of working sample. For peach, the 1,500 gram purity analysis may be considered the portion examined for noxious-weed seeds. In no other case does the amount examined for noxious-weed seeds need to exceed 500 grams.

PROPOSED RULE

1) Add the following kinds and associated information to Table 1. Weights for working samples, TREE and SHRUB SEEDS.

Kind of seed	Minimum weight for purity analysis[a]	Approximate number of seeds per gram	Approximate number of seeds per ounce
	Grams	Number	Number
Aesculus pavia L. red buckeye	4,500	--	3
Carya illinoensis (Wangenheim) K. Koch pecan	2,300	--	6

Carya ovata (Miller) K. Koch shagbark hickory	2,300	--	6
Casuarina spp. beefwood	3	1,030	29,300
Cornus florida L. flowering dogwood	300	10	280
Cornus stolonifera Michaux red-osier dogwood	75	40	1,150
Crataegus mollis Scheele downy hawthorn	110	24	653
Eucalyptus deglupta Blume Mindanao gum	½	10,000	280,000
Eucalyptus grandis Maiden rose gum	5	715	20,000
Grevillea robusta R. Brown silk-oak	40	66	1,875
Libocedrus decurrens Torrey incense-cedar	75	32	900
Liriodendron tulipifera L. yellow-poplar	80	31	875
Magnolia grandiflora L. southern magnolia	200	14	400
Nyssa aquatica L. water tupelo	500	1	30
Pinus canariensis C. Smith canary pine	275	9	260
P. caribaea Morelet caribbean pine	40	67	1,900
P. clausa (Chapman) Vasey sand pine	15	165	4,700
P. glabra Walters spruce pine	25	102	2,900
P. kesiya Gordon (Syn. P. khasya) khasia pine	50	51	1,440
P. luchuensis Mayr Formosa pine	30	80	2,260
P. merkusii Junghuhn & DeVriese merkus pine	65	39	1,100

P. muricata D. Don bishop pine	25	102	2,900
P. patula Schiede & Deppe Jelecote pine	20	116	3,300
P. pinaster Aiton cluster pine	110	22	625
P. pinea L. Italian stone pine	500	1	40
P. radiata D. Don monterey pine	80	30	830
P. serotina Michaux pond pine	20	120	3,400
Platanus occidentalis L. American sycamore	6	425	12,000
Populus spp. poplar	½	1,000 - 6,000	30,000 - 180,000
Quercus spp. red or black oak group	700	--	20
Q. alba L. white oak	1,750	--	8
Q. muehlenbergii Engelmann chinkapin oak	560	—	25
Q. virginiana Miller live oak	630	--	22
Rhododendron spp. rhododendron	½	11,000	312,500
Vitis vulpina L. riverbank grape	80	32	900

2) Revise footnote a after Table 1 to read:

If it is necessary to conduct a noxious-weed seed examination, see section 2.3 to determine size of the working sample. For those kinds listed that show over 500 grams as the minimum weight for purity analysis, the actual amount given shall also be considered the minimum quantity to be examined for noxious-weed seeds. In no other cases does the amount examined for noxious-weed seeds need to exceed 500 grams.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED CHANGE

Genera and species with official germination test prescriptions in the Rules should also have guidelines for working sample weights. Most amounts given are based on information found in USDA, Agr. Handbook 450. Minimum weights represent approximately 2,500 seeds or in the case of large seeds, 500 seeds. Footnote a has been revised to accommodate the addition of several large-seeded kinds to Table 1.

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2. PROPOSAL
Standardization of scientific names in Table 5

PRESENT STATUS
The authority appears with the scientific name for most kinds listed in Table 5 which are not found in Table 1. For trees and shrubs listed in both Table 5 and Table 1, the authority appears only in Table 1 following the scientific name.

PROPOSED RULE
Delete the authority if present from the scientific names in Table 5.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE
If Proposal 1 is adopted, all authorities deleted in Table 5 will appear after the appropriate scientific names added to Table 1. This is a change to standardize information presented in Table 5. If adopted, authorities for all trees and shrubs in the Rules will only be found in Table 1.

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3. PROPOSAL
Define prechill in 4.2 f and transfer instructions for prechill from 4.2 f to 4.9

PRESENT RULE
4.2 f. Prechill.--Place the seed on or in moist substrata at the indicated low temperature for the specified period of time. Tree and shrub seeds may be prechilled whenever it is deemed necessary.

Procedures for tree and shrub seed prechill:
(1) Place seed in closed dish on substratum.
(2) Place seed in a loosely woven bag or screen and insert in a moisture holding medium such as peat, sand, or vermiculite.
(3) Soak seed for 24 hours in tap water at room temperature (18-22°C), drain excess water and place in a suitable capped glass or plastic vial, or polyethylene bag.

PROPOSED RULE

1) Replace existing information in 4.2 f with the following:

4.2 f. Prechill.--A cold, moist treatment applied to seeds to overcome dormancy prior to the germination test. The prechill method varies among species, but is usually performed by holding imbibed seeds at a low temperature for a specified period of time.

2) Transfer the following information from 4.2 f to a new 4.9 1 (1) and add an additional statement as item d :

4.9 1. Prechill.--

(1) Procedures for tree and shrub seed prechill:

a. Place seed in a closed dish on the substratum.

b. Place seed in a loosely woven bag or screen and insert in a moisture holding medium such as peat, sand, or vermiculite.

c. Soak seed for 24 hours in tap water at room temperature (18-22°C), drain excess water and place in a suitable capped glass or plastic vial, or polyetheylene bag.

d. Place imbibed seed from a, b and c at 2-5°C.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

As currently written, 4.2 f is not a definition, but instructions on how to prechill. This proposal offers a definition for prechill and moves the instructions to the proper place in the Rules.

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4. PROPOSAL

Addition of definition for paired tests in 4.2, instructions for doing paired tests in 4.9 and procedures for reporting paired tests in 4.7

PRESENT STATUS

For many tree and shrub species prechill requirements differ due to origin or year of collection, and paired tests (with and without prechill) have become a common practice in many laboratories. However, paired tests are not defined in the Rules. Some labs use two replicates of 100 seeds for each test condition, while most use four replicates of 100 for each condition of a paired test. The Rules strongly imply that the latter method is correct, but 4x100 is not clearly stated.

Those species for which paired tests are normally conducted are not clearly designated in Table 5.

PROPOSED RULE

1) Add the following definition to 4.2:

h. Paired tests.--Test procedures used on seeds having an unknown degree of dormancy. Samples are tested both with and without prechill (or other treatments prescribed for breaking dormancy).

2) Add the following instructions to 4.9:

4.9 1. Prechill and Paired tests.--

(2) For some tree and shrub species in Table 5, dormancy may vary by geographic origin or year of collection. Paired tests (with and without prechill) are recommended for some species. These are designated in the "Additional Directions" column of Table 5 by the term "Paired tests." In cases where reliable information exists on variations in prechill requirements, this information is also supplied. For paired tests, 400 seeds (four 100 seed replicates) shall be used for each test condition (with and without prechill). See Note under section 4.6.

3) Add the following information to 4.7:

4.7 c. When paired tests are made, percentage germination shall be reported for each test condition.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

Variable dormancy and prechill requirements are now known for many species, and users of the Rules should have this information. The use of paired tests is of great benefit to seed users, but the Subcommittee feels that the integrity of the Rules depends on the 4x100 protocol. To weaken this procedure would weaken the integrity of AOSA. For official tests, 4x100 seeds should remain the standard. Definitions and instructions for paired tests are needed in the Rules. Paired tests are not required, but only recommended for those kinds designated.

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5. PROPOSAL

Size of submitted sample for paired tests

PRESENT RULE

1.4 Size of submitted sample

a.(6) Tree and shrub seed samples shall consist of at least 600 seeds per sample for germination purposes. If a purity analysis or a noxious-weed seed examination is required, the submitted sample shall provide at least the minimum weights of working samples set forth in section 2.4.

PROPOSED RULE

Revise the first sentence of 1.4a(6) to read as follows:

> Tree and shrub seed samples shall consist of at least 600 seeds per sample for germination purposes (1,000 seeds for paired tests).

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

If Proposal 4 is adopted, this change in wording within section 1.4a(6) is needed.

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6. PROPOSAL

Modification of 4.9e

PRESENT RULE

4.9 Explanation of Tables 3, 4 and 5

e. Light.--Where light is prescribed in Tables 3, 4, and 5 it should be provided by a cool white fluorescent source. The illuminance for dormant seed should be 75-125 ft-c (750-1250 lux). The seeds should be illuminated for at least 8 hours in every 24. Where the seeds are germinated at alternating temperatures they should be illuminated during the high temperature period. Except for ryegrass fluorescence tests in rolled filter paper, seeds for which light is prescribed should be germinated on top of the substratum. Except for tree and shrub seed, illuminance for non-dormant seed and during seedling development (to enable the essential structures to be evaluated with greater certainty) may be as low as 25 ft-c.

For tree and shrub seed, an intensity of at least 50 ft-c, and preferably 75-100 ft-c, should be provided. Up to 16 hours of light may be beneficial to some kinds and certain lots of other kinds, as noted in Table 5.

PROPOSED RULE

4.9 e. Light.--Where light is prescribed in Tables 3 and 4, it should be provided by a cool white fluorescent source. The illuminance for dormant seed should be 75-125 ft-c (750-1250 lux). The seeds should be illuminated for at least 8 hours in every 24. Where the seeds are germinated at alternating temperatures, they should be illuminated during the high temperature period. Except for ryegrass fluorescence tests in rolled filter paper, seeds for which light is prescribed should be germinated on top of the substratum. Illuminance for non-dormant seed and during seedling development (to enable the essential structures to be evaluated with greater certainty) may be as low as 25 ft-c.

For tree and shrub seeds, light shall be provided as described above for all species in Table 5 with the following provisions: (a) Illuminance for non-dormant seed and during seedling development shall remain at 75-125 ft-c; (b) Up to 16 hours of light may be beneficial in some test conditions and for some lots, as noted in Table 5, but continuous light should not be used unless it is known that this does not inhibit germination of the species.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

An 8-hour light period is a standard practice in tree seed testing. There are no known species in Table 5 for which darkness is necessary. Specific instructions for the use of light are therefore unnecessary in Table 5, except for those species which have apparently germinated better under conditions with "more than 8 hours of light" or "16 hours of light." The Subcommittee also feels that valid evidence should be required for a prescription of continuous light for any species in Table 5.

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7. PROPOSAL

Changes under Additional Directions in Table 5

PRESENT STATUS

Under Additional Directions, "Light" and prechill temperatures are prescribed for many species in Table 5.

PROPOSED RULE

1) Under Additional Directions in Table 5 delete the word "Light" (when no time periods are also indicated) and delete prechill temperatures if present.

2) Under Additional Directions heading in Table 5, insert: (see Sec. 4.9 e and 4.9 1).

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

This proposal is contingent on adoption of Proposals 3 and 6.

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8. PROPOSAL

Designations for "Paired tests" and changes in prechill information for some species in Table 5

PRESENT STATUS

Under Additional Directions in Table 5, no clear prescription for "Paired tests" is given. Also, prechill periods and information in this Table should be modified or deleted for some species.

PROPOSED RULE

Under Additional Directions in Table 5, delete and add the information below for the following species:

Kind of seed	Additional Directions Present Wording:	Additional Directions Proposed Wording:
Abies amabilis	Light; prechill 0-5°C 14 days. Light; some sources may need prechill 21 days at 3-5°C.	Prechill 21 days.
A. concolor	Light; many lots complete in 14-21 days. A few sources from from the Pacific coast region may need prechill for 3 weeks at 3-5°C.	Paired tests. Pacific Coast sources may need 21 days prechill.
A. grandis	Light; prechill 14 days at 3-5°C. Vermiculite (P) is satisfactory. Dark; prechill 21 days at 3-5°C.	Prechill 14 days.
A. lasiocarpa	Light.	Prechill 21 days.
A. procera	Light; prechill 14 days at 3-5°C. Vermiculite is recommended if TB is not used. Dark; prechill 21 days at 3-5°C.	Prechill 14 days.
Crataegus mollis	2 hrs. H_2SO_4, followed by 90 days prechill at 20°C then 120 days at 3-5°C. TZ^b may also be used.	Soak in conc. H_2SO_4 for two hours, followed by 90 days incubation at 20°C, then prechill 120 days. TZ^b may also be used.
Cupressus arizonica	Light; some lots need 20 days prechill.	Paired tests. Some lots need 21 days prechill.
Larix occidentalis	Light; if dormant, prechill or use KNO_3.	Paired tests. Prechill 21 days or use KNO_3.
Liriodendron tulipifera	Prechill 60 days at 3-5°C; or use TZ or embryo excision.	Prechill 60-90 days.
Nyssa sylvatica	Prechill 21 days; very few lots dormant.	Prechill 28 days.

Picea engelmannii	Light; sensitive to excessive moisture; use KNO_3 if dormant.	Paired tests. Prechill 21 days or use KNO_3.
P. glauca	Light; some Canadian seed sources require prechill for 14-21 days at 3-5°C.	Paired tests. Prechill 21 days.
P. sitchensis	Light; more than 8 hr light may be beneficial to some lots; if dormant add KNO_3.	Paired tests. Prechill 21 days or use KNO_3. More than 8 hr light may be beneficial.
Pinus canariensis	Light; sensitive to warm temperatures; 1-day soak prior to test helpful.	Soak 1 day in water prior to test.
P. cembra	Use embryo excision method[a]. TZ[b] may also be used. Prechill 6-9 months at 3-5°C.	Use embryo excision method[a] or TZ[b]. Prechill 180-270 days.
P. cembroides	Use embryo excision method[a] for dormant lots.	Paired tests. Prechill 21 days or use embryo excision method[a].
P. contorta var. *latifolia*	Light; prechill 28 days at 3-5°C.	Paired tests. Prechill 21 days.
P. coulteri	Use embryo excision method[a]. Prechill for 8 or 12 weeks at 3-5°C.	Use embryo excision method[a]. Prechill 60-90 days.
P. echinata	Light; 8 hr light may be beneficial to some lots; sensitive to drying.	Paired tests. Prechill 14 days.
	No prechill and prechill 28 days at 3-5°C. 16 hrs. light (both methods each sample).	Paired tests. Prechill 28 days. Use 16 hr light.
P. elliottii	Light; 8 hr light may be beneficial to some lots; sensitive to drying.	(Delete remarks under this column)
	Light; no prechill, and prechill 28 days at 3-5°C. 16 hr. light (both methods each sample).	
P. jeffreyi	Light; embryo excision method applicable to dormant lots. Prechill for 4 or 8 weeks at 3-5°C.	Paired tests. Prechill 28 days or use embryo excision method[a].
P. lambertiana	Use embryo excision method[a]. Prechill 8 or 12 weeks at 3-5°C.	Use embryo excision method[a]. Prechill 60-90 days.

P. monticola	Use embryo excision method[a]. Prechill 8 or 12 weeks at 3-5°C.	Use embryo excision method[a]. Prechill 60-90 days or incubate 28 days at room temperature, then prechill 60 days.
P. pinaster	Light; sensitive to temperature and possibly moisture; some seed sources need prechill.	Paired tests. Prechill 28 days.
P. pinea	Light; soak 1 day prior to test; some lots sensitive to warm temperatures.	Soak 1 day in water prior to test.
P. ponderosa	Light; prechill 28 days at 3-5°C.	Paired tests. Prechill 28 days.
P. radiata	Light; more than 8 hr may be beneficial; prefers good moisture supply; prechill 21 days at 3-5°C.	Prechill 21 days. More than 8 hr light may be beneficial.
P. strobus	Light; more than 8 hr light may be beneficial to some lots; sensitive to drying; prechill 28-42 days at 3-5°C.	Paired tests. Prechill 28-42 days. More than 8 hr light may be beneficial.
	Light for 16 hr.; prechill 28-42 days at 3-5°C.	Prechill 28-42 days. Use 16 hr light.
P. sylvestris	Light; seed from eastern Mediterranean (Turkey, Greece, Bulgaria) provinces may require prechill 21 days at 3-5°C.	Paired tests. Mediterranean sources may need 21 days prechill.
P. taeda	Light; more than 8 hr light may be beneficial to some lots; sensitive to drying. No prechill and prechill 28 days at 3-5°C. 16 hr light (both methods each sample).	Paired tests. Prechill 28 days. Paired tests. Prechill 28 days. Use 16 hr light.
P. virginiana	16 hr light Light; 8 hr light may be beneficial to some lots	(Delete remarks under this column)
Pseudotsuga menziesii var. *caesia*	Light; prechill 21 days at 3-5°C. Vermiculite recommended if TB not used.	Prechill 21 days.

P. menziesii var. glauca	Light; central and southern Rocky Mountain sources not sensitive to temperature. Vermiculite recommended if TB not used.	Paired tests. Prechill 21 days.
P. menziesii var. menziesii	Light; prechill 21 days at 3-5°C. Vermiculite or Perlite (sponge rok) recommended if TB not used.	Paired tests. Prechill 21 days.
Sequoiadendron giganteum	Light; sensitive to drying; may prechill 30 days.	Paired tests. Prechill 30 days.
Thuja plicata	Light; use KNO_3 if dormant.	(Delete remarks under this column)
Tsuga heterophylla	Light.	Paired tests. Prechill 21 days.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

Most of the changes proposed are based on adoption of Proposals 3, 4, and 6. Changes in prechill periods are based either on data in Agr. Handbook 450 or research and testing experience by Dr. George Edwards (Victoria, B.C.) and Dr. Frank Bonner (Starkville, MS).

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9. PROPOSAL

Delete statements about moisture or temperature conditions under Additional Directions for several species in Table 5

PRESENT RULE

Under Additional Directions in Table 5, comments are made that Liquidambar styraciflua is "sensitive to drying in test," Pinus clausa is "sensitive to excess moisture" and Pinus halepensis is "sensitive to warm temperature."

PROPOSED RULE

Delete the comments above under Additional Directions for the species indicated.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

"Sensitive to drying," "sensitive to excess moisture," etc. could be statements used for most species in Table 5. There is no specific reason to make these statements for Liquidambar styraciflua, Pinus clausa and P. halepensis.

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10. PROPOSAL

Change in germination prescriptions for Acer species in Table 5

PRESENT RULE

Kind of seed	Substrata	Temperature °C.	Test duration days	Additional Directions
Acer spp. (See Purity Table 1). maples, boxelder	P	18 to 22	14	Use embryo excision method[a]. Prechill 2 months 3-5°C. It is an advantage to remove the pericarp before testing.

PROPOSED RULE

Kind of seed	Substrata	Temperature °C.	Test duration days	Additional Directions
Acer rubrum red maple	TB	20-30	21	Northern U.S. and Canadian sources need 45-60 days prechill. Southern U.S. sources need no prechill.
Acer saccharinum silver maple	TB	20-30	21	
Acer spp. (all other maples, boxelder-see Purity Table 1).	TB P	20-30 18-22	28 14	Prechill 45-130 days. Use embryo excision method[a].

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

(1) Acer, Maple in USDA Ag. Handbook 450.

(2) Wang, B.S.P. and B.D. Haddon. 1978. Germination of red maple seed. Seed Sci. & Technol. 6:785-790.

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11. PROPOSAL

Change in germination prescriptions for Chamaecyparis species in Table 5

PRESENT RULE

Kind of seed	Substrata	Temperature °C.	Test duration days	Additional Directions
Chamaecyparis spp. (See Purity Table 1). cedars, falsecypress	TB, P	20	28	Use KNO_3 if dormant.

PROPOSED RULE

Kind of seed	Substrata	Temperature °C.	Test duration days	Additional Directions
Chamaecyparis lawsoniana Port Orford cedar	TB, P	20	28	Use KNO_3 if dormant.
Chamaecyparis nootkatensis Alaska cedar	TB, P	20	28	Incubate 28 days at room temperature, then prechill 120 days.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE
Research by Dr. George Edwards (Victoria, B.C.) indicates that the dormancy breaking procedures for these two Chamaecyparis species are different.

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12. PROPOSAL
Change in germination prescriptions for Cornus stolonifera in Table 5

PRESENT RULE

Kind of seed	Substrata	Temperature °C.	Test duration days	Additional Directions
Cornus stolonifera red-osier dogwood	P	18-22	10	Prechill 90 days at 3-5°C. Embryo excision.

PROPOSED RULE

Kind of seed	Substrata	Temperature °C.	Test duration days	Additional Directions
Cornus stolonifera red-osier dogwood	TB, TC	20-30	28	Prechill 120-160 days. TZ^b may also be used.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE
AOSA/USDA Handbk. on Seeds of Browse--Shrubs and Forbs. U.S. For. Serv. Tech. Publ. R8-TP8, 1985. Pages 89-90.

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13. PROPOSAL

Change in germination prescriptions for Fraxinus species in Table 5

PRESENT RULE

Kind of seed	Substrata	Temperature °C.	Test duration days	Additional Directions
Fraxinus spp. (See Purity Table 1). white ash	P	18-22	10-14	Use embryo excision method[a]. TZ[b] may also be used. Prechill 3-5°C in moist substratum 3 months.

PROPOSED RULE

Kind of seed	Substrata	Temperature °C.	Test duration days	Additional Directions
Fraxinus americana white ash	P	18-22	10-14	Use embryo excision method[a]. TZ[b] may also be used.
	TB, TC	15-25	28	Northern sources more dormant than southern. Prechill 60-140 days.
Fraxinus pennsylvanica green ash	TB, TC	20-30	28	Prechill southern sources 60-90 days. Prechill. northern sources up to 140 days (30-60 day incubation at 20°C prior to prechill may be helpful).
Fraxinus excelsior European ash	P	18-22	10-14	Use embryo excision method[a]. TZ[b] may also be used.
	TB	20-30	28	Incubate 60-90 days at 20°C, then prechill 90 days.
Fraxinus latifolia Oregon ash	P	18-22	10-14	Use embryo excision method[a]. TZ[b] may also be used.
	TB	20-30	28	Incubate 60-90 days at 20°C, then prechill 90 days.
Fraxinus nigra black ash	P	18-22	10-14	Use embryo excision method[a]. TZ[b] may also be used.
	TB	20-30	28	Incubate 60-90 days at 20°C, then prechill 90 days.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

(1) Fraxinus, Ash in USDA Ag. Handbook 450.

(2) Bonner, F.T. 1975. Germination temperatures and prechill treatments for white ash (Fraxinus americana L.). Proc. AOSA 65:60-65.

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14. PROPOSAL

Change under Additional Directions for Betula spp. in Table 5

PRESENT STATUS AND PROPOSED RULE

Kind of seed	Additional Directions Present Wording:	Additional Directions Proposed Wording:
Betula spp.	Light.	More than 8 hr light may be beneficial for some species.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

Research by Ben Wang (Ontario National Tree Seed Centre) indicates a change in light specifications for Betula is needed.

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15. PROPOSAL

Change in germination prescription for Begonia spp. (begonia) in Table 4

PRESENT RULE

Substrata	Temperature °C.	First Count days	Final Count days	Additional Directions
P	20-30	none	16	Light.

PROPOSED RULE

Substrata	Temperature °C.	First Count days	Final Count days	Additional Directions
P, TB	20	14	21	Light.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

Data from the NY State Seed Laboratory and the W. Atlee Burpee Laboratory indicate that for both fibrous and tuberous rooted types of begonias 20°C was preferable. Also, seedling evaluations were much easier at 20°C for seedlings exhibited greater root and cotyledon development.

For a number of years we have been aware of the contradiction between the temperature prescribed by AOSA for testing begonia seed and the temperatures suggested in the literature for growing begonias from seed. While AOSA prescribes 20-30°C (68-86°F) the literature suggests: 60-75°F (5) or 65-70°F (1)(3); 65°F (2) or 70-75°F (4) for tuberous rooted types and 70°F (2) or 65-75°F (4) for fibrous rooted types. Since none of the above sources suggested a temperature nearly as high as AOSA, we decided to run duplicate tests of begonias at 20°C (68°F). Germination data from 126 tests run at 20°C and at 20-30°C was collected and a T test was performed. The results were as follows:

T test on all samples (126).		mean
	20°	74.5
	20-30°	52.9
T test on fibrous rooted samples (112).		
	20°	75.8
	20-30°	54.9
T test on tuberous rooted samples (14).		
	20°	69.2
	20-30°	39.6

In addition to finding that the seedlings were easier to evaluate because of the greater amount of root and cotyledon development, there was also a significant increase in germination percentage at 20°C. Extending the final count to 21 days may be necessary for some lots.

1. Anonymous. 1940. Raising begonias from seed. Flower Grower 27(2):65.
2. Ball, V. editor. 1985. Ball Red Book; Greenhouse Growing. 14th edition, Prentice Hall Co., Reston, VA pg. 357.
3. Drummond, W.C. 1955. Begonia seed growing. Begonian 22:14.
4. Reilly, Ann. 1978. Parks' Success with Seeds. Geo. W. Park. Seed Co. Inc., Greenwood, S.C. pg. 93.
5. Schwerdtfeger, L. 1952. Growing begonias from seed. Begonian 19:6-7.

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16. PROPOSAL

Change in germination prescription for Molucella laevis L. (bells of Ireland) in Table 4

PRESENT RULE

Substrata	Temperature °C.	First Count days	Final Count days	Additional Directions
P, T	10-30	7	21	Light and good moisture supply.

PROPOSED RULE

Substrata	Temperature °C.	First Count days	Final Count days	Additional Directions
P, T, TB	10-30; 15-25; 20-30	7	21	Light; prechill 7 days at 5°C. Use embryo excision method[d].

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

The present rule is an inconvenient procedure which requires the analyst to provide 10-30°C regime by manually changing the sample twice daily (in the a.m. and then in the p.m.), since germinators are not generally set at 10-30°C. The proposed rule of adding the alternate temperatures of 20-30°and 15-25°C, as well as providing an alternate method of embryo excision, provides a more suitable procedure for routine testing while providing the necessary test conditions.

Information concerning this species is limited for it is not one of the more popular flower species. Two articles concerned with seed germination are:

Heit, C.E. 1955. Preliminary studies on laboratory germination of Bells of Ireland (Molucella laevis). Proc. Assoc. Off. Seed Anal. 45:60-63.

Heit, C.E. 1958. Additional information and suggested methods for germination of Bells of Ireland (Molucella laevis). Proc. Assoc. Off. Seed Anal. 48:100-103.

Heit (1955) first supported the temperature of 20-30°C but later (1958) favored 10-30°C due to the faster germination response. I have found the three alternating temperatures of 10-30°, 20-30°, and 15-25°C produce comparable results. A prechill hastens the rate of germination but does not increase the percent germination. And, in lower quality seed lots, germination may be reduced with the prechill treatment.

Molucella belongs to the Lamiaceae family and has an inner, semipermeable seed coat which may restrict imbibition and/or oxygen uptake causing delayed germination. This condition is eliminated by using the alternate method of embryo excision (EE). This method is also favored to determine the viability of ungerminated seed at the end of the test when the prescribed alternating temperatures have been used.

The data I have collected to date is as follows: (21 days tests)

	10-30°	20-30°	15-25°	7 day prechill	EE
1.	87	80	71	90	--
2.	71	78	78	55	--
3.	98	93	97	97	--
4.	79	74	72	58	--
5.	76	70	62	57	--
6.	98	92	97	97	--
7.	98	92	98	97	--
8.	82	73	77	83	--
9.	72	83	80	88	--
10.	86	84	--	88	86
11.	90	95	--	--	93
12.	92	92	--	92	93
13.	87	87	--	89	84
14.	96	--	--	--	96

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17. PROPOSAL

Change in genus name and germination prescription for geranium in Table 4

PRESENT RULE

Kind of seed	Substrata	Temperature °C.	First count days	Final count days
Geranium spp. geranium	B, T	20-30	7	28[c]

PROPOSED RULE

Kind of seed	Substrata	Temperature °C.	First count days	Final count days
Pelargonium spp. geranium	B, T, TB	20	7	28[c]
Alternate method (for clipped and scarified seeds)	B, T, TB	20	7	14[c]

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

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

Testing raw, or untreated seed at 20°C resulted in fewer swollen seed at the end of the test as compared to 20-30°C. Even with the extension of 5 additional days at the end of the test [see 4.9d(6)] many swollen seed remained at 20-30°C, resulting in a lower total germination than at 20°C. Many samples of geranium seed tested today have either been mechanically or acid scarified, or clipped to alleviate hardseededness. For these samples a 14 day test duration is sufficient.

Eighty-nine lots of geranium seed were tested at 20°C and at 20-30°C for 28 days [+5 additional days for swollen seed [4.9d(6)]]. The lots were either raw, scarified, or clipped seed. The results were compiled and analyzed and the following observations were made:

1. For the raw seed only, there was a significant difference in the total percent germination and hard seed. The total germination was greater at 20°C for many of the swollen seed remained swollen at 20-30°C even after the five additional days.

	mean (29 samples)
20°C	94.34
20-30°C	87.52

2. For the 60 samples of scarified and/or clipped seed there was no significant difference between the germination or total germination and hard seed at 20°C or 20-30°C.

3. For the 60 samples of scarified and/or clipped seed there was no significant increase in percent germination or total percent germination and hard seed between the 14 and the 28 day test at either temperature.

In Heit's 1971 article entitled "Germination Studies with Geranium Seed" (Proc. Assoc. Off. Seed Anal. 61:105-111) he also suggests reducing the test duration to 14 days for scarified seed lots. Aleta Meyr, SCST Co-Chairman for the Flower Seed Subcommittee, also reported in the Sept. 1985 issue of the AOSA Newsletter the results of her Scarified Geranium Germination Referee. The results indicate that the preference of the analysts was a 14 day test at 20°C.

Dr. C. R. Gunn, Chairman of the Nomenclature Committee, recommends using Pelargonium as the genus name for the cultivated geraniums instead of Geranium.

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18. PROPOSAL

Change in germination prescriptions for *Petunia* x *hybrida* Vilmorin and *Petunia* spp. and combining both in Table 4

PRESENT RULE

Kind of seed	Substrata	Temperature °C.	First count days	Final count days	Additional Directions
Petunia x *hybrida* Vilmorin petunia	P	20-30	6	10	Light; use blue blotter as substratum for easier reading.
Petunia spp. petunia	P	20-30	7	10	Be careful about confusing seedling weakness with normal, stubby seedling development. KNO_3 and prechilling may be necessary for certain sensitive stocks.

PROPOSED RULE

Combine information of the two prescriptions above for petunia into the following:

Kind of seed	Substrata	Temperature °C.	First count days	Final count days	Additional Directions
Petunia spp. petunia	P, TB	20-30; 20	7	10	Light; KNO_3 and prechilling may be necessary for certain cultivars. Seedling appearance varies with cultivar and the short-rooted types (dwarf compact, ruffled, and double flowered) may be more easily evaluated when tested at 20°C.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

Eighty-six lots of petunias were tested at both 20°C and 20-30°C and no significant difference was found in the percent germination (mean 20°C = 82.7, mean 20-30°C = 82.0). However, seedlings which exhibit short or stubby roots at 20-30°C produce longer, normal appearing roots at 20°C, making evaluations much easier.

In "Petunia Germination Studies and Helpful Hints on Seedlings Interpretations" (AOSA Newsletter 42(4), 1968) Heit also comments on the uniformity of comparative tests at 20°C and at 20-30°C and states that seedling "characteristics" vary with temperature.

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19. PROPOSAL

Change in germination prescription for Viola cornuta L. (viola) in Table 4

PRESENT RULE

Substrata	Temperature °C.	First Count days	Final Count days	Additional Directions
TB	20; 20-30	none	12	Some cultivars may complete germination prior to 12 days.

PROPOSED RULE

Substrata	Temperature °C.	First Count days	Final Count days	Additional Directions
TB	20; 20-30	7	21	Prechill 7 days at 5°C with KNO_3.

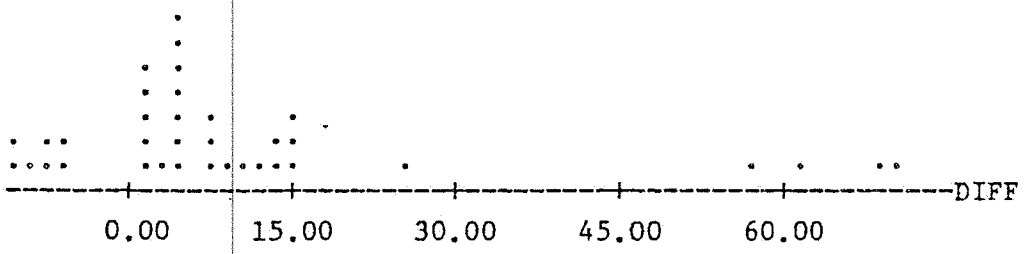
SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

The present rule does not recognize dormancy in Viola spp. As with other species it varies with age, variety and pretreatments. Dormancy has been recognized by ISTA and their "rules" also suggest a prechill and KNO_3 for breaking the dormancy. The Final Count has been extended, for some samples require more than the additional 2 day extension allowed [4.9 d(4)] to complete germination. Information under Additional Directions in the Present Rule should be deleted since 4.9 d(3) covers termination of the test prior to the Final Count.

Thirty-six samples were tested with and without prechill and KNO_3 treatment. Below is a histogram showing the difference in percent germination between the two testing procedures. Please note that there are several tests with a large difference in the percent germination with the prechill and KNO_3 treatment, which indicates the presence of dormancy. For those samples which were not dormant there should be little difference, and for low quality lots the prechill and KNO_3 treatment may reduce the percent germination.

Histogram of DIFF N = 36

Midpoint	Count	
-15.0	1	*
-5.0	6	******
5.0	17	*****************
15.0	7	*******
25.0	1	*
35.0	0	
45.0	0	
55.0	1	*
65.0	2	**
75.0	1	*



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20. PROPOSAL
Change in germination prescription for Viola tricolor L. (pansy) in Table 4

PRESENT RULE

Substrata	Temperature °C.	First Count days	Final Count days	Additional Directions
TB	20; 20-30	none	12	Some stocks and strains may complete emergence in 7-8 days.

PROPOSED RULE

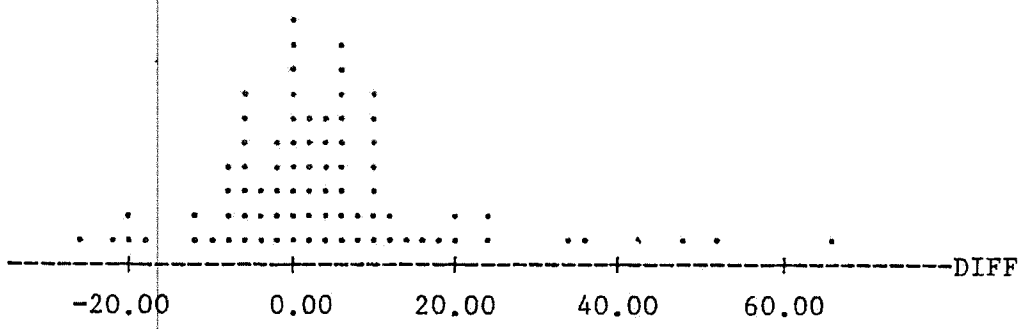
Substrata	Temperature °C.	First Count days	Final Count days	Additional Directions
TB	20; 20-30	7	21	Prechill 7 days at 5°C with KNO_3.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE
The present rule does not recognize dormancy in Viola spp. As with other species it varies with age, variety and pretreatments. Dormancy has been recognized by ISTA and their "rules" also suggest a prechill and KNO_3 for breaking the dormancy. The Final Count has been extended, for some samples require more than the additional 2 day extension allowed [4.9 d(4)] to complete germination. Information under Additional Directions in the Present Rule should be deleted since 4.9 d(3) covers termination of the test prior to the Final Count.

Eighty-one samples of pansies were tested with and without prechill and KNO_3 treatment. Below is a histogram showing the difference in percent germination between the two testing procedures. Please note that there are several tests with a large difference in the percent germination with the prechill and KNO_3 treatment, which indicates the presence of dormancy. For those samples which were not dormant there should be little difference, and for low quality lots the prechill and KNO_3 treatment may reduce the percent germination.

Histogram of DIFF N = 81

Midpoint	Count	
-25.0	4	****
-15.0	4	****
-5.0	25	*************************
5.0	30	******************************
15.0	10	**********
25.0	3	***
35.0	2	**
45.0	1	*
55.0	1	*
65.0	1	*



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21. PROPOSAL
Addition of Elymus elymoides--bottlebrush squirreltail 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 elymoides (Rafinesque) Swezey bottlebrush squirreltail	9	90	190-520 (300)	5,400-14,800

2) Add Elymus elymoides to the second sentence in section 2.6b (3) for seed unit classification.
3) Include in Table 3 (Methods of testing for labortory germination, AGRICULTURAL SEEDS) the following:

Kind of seed	Substrata	Temperature °C	First count days	Final count days
Elymus elymoides bottlebrush squirreltail	P, B	15; 20	10	14[d]

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

4) Section 6e (Other grasses) of APPENDIX 1. Seedling Descriptions shall be used for normal and abnormal classification.
5) Add this species to Handbook No. 25 (Uniform Classification of Weed and Crop Seeds) and consider it as classification 3.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

1) Pure seed consists of seed units of the grass family listed in Sections 2.6b (3) and 2.7g. Awns may or may not remain attached to fertile florets after commercial cleaning, but fertile florets with sterile florets attached occur only at low frequencies. The sterile florets are usually not as long as the fertile florets, making a multiple floret procedure unnecessary. Rachis segments may also be attached to spikelets and should not be removed.

The working weights listed above are based on 300-unit samples from 14 seed lots. The variation in weight reflects variation in floret size in this widely-distributed polymorphic native species.

2) Squirreltail is reported to have little or no post-harvest dormancy and to germinate relatively quickly over a broad temperature range (Young and Evans 1977). Both 15°C and 20°C gave germination not significantly different from maximum. Germination was over 95% complete in 14 days at both of these temperatures.

In an experiment at 20°C with 4 sources, there was no treatment response to light, nitrate or GA. Germination was complete within 10 days. In an experiment testing the effects of nitrate and GA on 4 fresh sources at 15°C in the dark, percent germination at 14 days was not significantly different from percent viability by tetrazolium staining for any source in any treatment.

In an experiment with 10 fresh sources at 20°C in the dark, germination was complete at day 14 with no dormant seed remaining for all except one high elevation source. Because occasional slow-germinating sources may be encountered, determination of viability of ungerminated seed is recommended.

In a referee germination test using the proposed rule, 5 of 7 laboratories (AOSA and SCST) reported results which did not differ significantly.

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

LITERATURE CITED

Young, J. A., and R. A. Evans. 1977. Squirreltail seed germination. Jour. Range Manage. 30:33-36.

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22. PROPOSAL
Addition of Penstemon eatonii--firecracker penstemon to the Rules

PROPOSED RULE
1) Include in Table 4 (Methods of testing for laboratory germination, FLOWER SEEDS) the following:

Kind of seed	Substrata	Temperature °C.	First count days	Final count days	Additional Directions
Penstemon eatonii A. Gray firecracker penstemon	P	15	7	21	Prechill 60 days at 3-5°C; or use TZ[c].

2) Add the following footnote after Table 4:
[c]T.Z. tetrazolium; see section 4.9k(2).

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE
1) In a 3-source experiment in petri dishes with 6 temperature regimes, 15°C constant gave the highest 28-day germination for all sources. But germination never exceeded 30% of viable seed (as estimated by a tetrazolium test on a separate subsample).

In a dormancy-breaking experiment with 2 of the sources, light and potassium nitrate were ineffective in breaking dormancy, while GA3 resulted in germination of 65-85% of viable seed. But a referee test involving 9 laboratories showed that the dormancy-breaking effect of GA3 could not be duplicated reliably. A subsequent experiment with 7 fresh sources also showed GA3 to be of limited effectiveness (5-42% of TZ-viable seed germinated), while the water control resulted in less than 1% germination.

A prechill experiment with the original three sources resulted in increasing germination with increasing 5°C prechill period up to 8 weeks. Germination at 15°C after the 8-week prechill averaged 70% of TZ-viable seed, and was over 85% complete at 7 days and 95-100% complete at 21 days. Because of possible variation among seed lots in length of the necessary prechill, a tetrazolium test on ungerminated seed is recommended. A tetrazolium test in lieu of a germination test is offered as an alternate method.

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

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23. PROPOSAL

Addition of Penstemon palmeri--Palmer penstemon to the Rules

PROPOSED RULE

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

Kind of seed	Substrata	Temperature °C.	First count days	Final count days	Additional Directions
Penstemon palmeri A. Gray Palmer penstemon	P	15	14	28	Light.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

1) Seeds from 4 sources of Palmer penstemon were germinated in petri dishes with 6 temperature regimes. The 15°C constant regime gave the highest 28-day germination percent for all sources.

In an experiment at 15°C in the dark with 7 sources of fresh seed, all sources showed at least some dormancy when germination in water was compared with germination in GA3 and with total viability as estimated by tetrazolium staining on a separate subsample.

In an experiment at 15°C with 3 sources, light significantly increased germination of partially-dormant sources. Germination of nondormant seed was from 57% to 80% complete at 14 days and from 89% to 95% complete at 21 days. Dormant seeds remained at the end of the test, making post-germination tetrazolium testing of ungerminated seed necessary.

A two-week prechill at 5°C resulted in enhanced germination for some sources but severely reduced germination for others, and is therefore not recommended.

Nine laboratories (AOSA and SCST) participated in referee testing using the proposed procedures. Six laboratories had total viability estimates which did not differ significantly (range 73-84%), while 3 laboratories had somewhat higher values (86-92%).

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

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24. PROPOSAL

Addition of Penstemon strictus--Rocky Mountain penstemon to the Rules

PROPOSED RULE

1) Include in Table 4 (Methods of testing of laboratory germination, FLOWER SEEDS) the following:

Kind of seed	Substrata	Temperature °C.	First count days	Final count days	Additional Directions
Penstemon strictus Bentham Rocky Mountain penstemon	P	15	7	21	Light.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

1) Seeds from 5 sources of Rocky Mountain penstemon were germinated in petri dishes with 6 temperature regimes in the dark. The 15°C constant regime gave a 28-day germination percent as high as or higher than the other regimes for all sources. Dormant seed remained at the end of the test, especially in some fresh lots.

In a dormancy-breaking experiment at 15°C with 4 lots, light enhanced the germination of some partially dormant lots, while potassium nitrate did not. Germination in the light was from 17% to 55% complete at 7 days and 99% complete at 21 days. A few dormant seeds remained, however, making a tetrazolium test on ungerminated seed necessary.

In a prechill experiment with 4 sources, a 2-week prechill was only partially effective in breaking dormancy of the most dormant source. No source was more than 50% dormant, and this source afterripened quickly over a period of 3 months. The extra time involved in a prechill therefore does not seem warranted.

Nine laboratories (AOSA and SCST) participated in referee testing using the proposed rule. Only one laboratory had a significantly different value for percent viable seed, due to a difference in abnormal seedling classification. There were, however, significant differences in total percent germination, emphasizing the need for a tetrazolium test on ungerminated seed.

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

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25. PROPOSAL

Addition of Secale montanum--mountain rye 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
Secale montanum Gussone mountain rye	28	280	90	2,500

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

Kind of seed	Substrata	Temperature °C	First count days	Final count days
Secale montanum mountain rye	B, T	15; 20	4	7[d]

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

3) Include Secale montanum in the list of species under section 6a of APPENDIX 1. Seedling Descriptions for normal and abnormal classification.
4) Add this species to Handbook No. 25 (Uniform Classification of Weed and Crop Seeds) and consider it as classification 3.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

1) The working weights listed above are based on 500-seed samples from each of 5 lots.

2) Mountain rye is reported to have little post-harvest dormancy and to germinate well at temperatures from 10°C to 25°C (Buman 1986).

In an experiment with 3 sources at 20°C, there was no significant treatment response to light, potassium nitrate, or GA3. Germination was over 95% complete by day 4 and no dormant seeds were detected using tetrazolium staining on ungerminated seeds after day 7.

In an experiment with 2 very fresh (<2 weeks post harvest) sources at 6 temperature regimes in the dark, 3-day percent germination at 15°C and 20°C was not significantly different from percent viability as determined by tetrazolium staining on a separate subsample. A 7-day test period is recommended for accurate classificaion on normal and abnormal seedlings.

In a referee germination test using the proposed procedure, 4 of 8 laboratories (AOSA and SCST) obtained results which were not significantly different. When differences in abnormal seedling classification are taken into account, 7 of 8 laboratories had statistically comparable results.

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

LITERATURE CITED

Buman, R. S. 1986. Seed germination and seedling competition of mountain rye (Secale montanum Guss.), 'Hycrest' crested wheatgrass (Agropyron cristatum L. x Agropyron desortorum Fisch.), and downy brome (Bromus tectorum L.). M.S. Thesis, University of Wyoming, Laramie, Wyoming.

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26. PROPOSAL

Addition of Hedysarum boreale--northern sweetvetch to the Rules

PROPOSED RULE

1) Revise the Inert matter section 2.10a(11) to read:

The thin pericarp (fruit wall) if present on seeds of Purshia tridentata and Hedysarum boreale.

2) 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
Hedysarum boreale Nuttall northern sweetvetch	19	190	130	3,690

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

Kind of seed	Substrata	Temperature °C	First count days	Final count days
Hedysarum boreale northern sweetvetch	B, TB, T	15-25; 20	14	28[a]

[a]Hard seeds often present; see sections 4.2d and 4.9k(6).

4) Include Hedysarum boreale in the list of species under section 7d (small-seeded legumes) of APPENDIX 1. Seedling Descriptions for normal and abnormal classification.

5) Add this species to Handbook No. 25 (Uniform Classification of Weed and Crop Seeds) and consider it as classification 1.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

1) In northern sweetvetch, each "seed" is shed in an indehiscent loment or fruit segment. The seed is easily threshed from the loment using commercial seed-cleaning equipment, but is occasionally sold in the loment (unthreshed).

In an experiment to test the practicality of germinating seed in the loment, unthreshed seed had significantly lower 28-day germination than threshed seed. Fungal contamination was a problem, as was determination of hard seed at the end of the test. We therefore recommended that threshed seed be defined as pure seed and the pericarp (fruit wall) be removed and considered inert matter.

The weights of 500-seed samples from each of 11 seed lots were used to determine the working weights listed above.

2) Northern sweetvetch seed continues to soften and germinate over an extended time period. The 28-day test period gives time for the germination of seed which would probably be considered nondormant in the field, and also permits softening and deterioration of nonviable hard seed.

In order to verify the viability of hard seed, 28-day germination plus hard seed totals were compared with 7-day percent germination and viability by tetrazolium staining using artificially scarified seed for three sources. There were no significant differences in total percent viable seed among the three methods.

In experiments with 2 sources of unscarified seed, Young and Evans (unpublished data) found that 28-day germination was significantly higher at 15-25°C than at 15°C or 25°C. In a test with 4 fresh (1986) Utah sources, germination at 28 days was significantly lower at 15°C than at 15-25°C or at 20°C. There was no significant difference between results at 15-25°C and at 20°C; therefore, both temperatures are recommended.

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

LITERATURE CITED

Young, J. A., and R. A. Evans. Unpublished data on file at the Great Basin Experiment Station, Ephraim, Utah.

SUBMITTED BY

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27. PROPOSAL

Addition of Amelanchier alnifolia--saskatoon serviceberry 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
Amelanchier alnifolia (Nuttall) Nuttall saskatoon serviceberry	30	84	2,385

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

Kind of seed	Substrata	Temperature °C	Test Duration days	Additional Directions
Amelanchier alnifolia saskatoon serviceberry	P	20	14	Use embryo excision method[a]. TZ[b] may also be used.

[a]Embryo excision method: see section 4.9k(1).

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

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

1) The weight of a 500-seed samples from each of 11 lots was used to determine the working weights listed above, which are similar to those reported elsewhere (Brinkman 1974).

2) Saskatoon serviceberry seeds are known to require a lengthy (>90 day) prechill to break dormancy, and the length of the prechill necessary varies from lot to lot (McLean 1967; Brinkman 1974; Weber et al 1982). No other practical dormancy-breaking treatment has been found (Weber et al 1982).

In an experiment with 5 sources one or more years old from Utah and Idaho, a 12-week prechill resulted in germination of from 15% to 85% of viable seed (as estimated from tetrazolium staining on a separate subsample), while and 8-week prechill resulted in < 10% germination for all sources. Serious problems with fungal growth were encountered. Because of excessive length and uncertain results, a prechill procedure is not recommended.

In trials with 6 fresh sources from Utah, embryo excision gave a viability estimate not significantly different from tetrazolium staining results, using methods from Flemion (1948), Heit (1955), and Weber and Wiesner (1980). Embryos were placed in petri dishes at 20° in the dark but were checked periodically in the light. Germination of embryos in the 14-day test period varied from 0% to 44%, while at least 75% of the embryos showed active development (germination and/or growth and greening of cotyledons) in all but one source. Nonviable embryos deteriorated quickly. Clipping the cotyledon end for easier removal of embryos did not significantly affect viability estimates as compared with unclipped intact embryos.

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

LITERATURE CITED

Brinkman, K. A. 1974. Amelanchier Med. Serviceberry. p. 212-215. IN:C. S. Schopmeyer (ed.) Seeds of woody plants in the United States. Agric. Handbook No. 450, USDA, US Government Printing Office, Washington, D.C.

Flemion, F. 1948. Reliability of the excised embryo method as a rapid test for determining the germinative capacity of dormant seed. Contr. Boyce Thompson Inst. 15:229-241.

Heit, C. E. 1955. The excised embryo method for testing germination of dormant seed. Proc. Ass. Off. Seed Anal. 45:108-117.

McLean, A. 1967. Germination of forest range species from southern British Columbia. Jour. Range Manage. 20:321-322.

Weber, G. P., and L. E. Wiesner. 1980. Tetrazolium viability procedures for native shrubs and forbs. Jour. Seed Tech. 5:23-34.

Weber, G. P., L. E. Wiesner, and R. E. Lund. 1982. Improving germination of skunkbush sumac and serviceberry seed. Jour. Seed Tech. 7:60-71.

SUBMITTED BY
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28. PROPOSAL
Addition of Oryza to section 2.6b(3) of the Rules

PRESENT 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.

PROPOSED RULE
2.6 Seed unit.--
b.(3) Entire spikelets in Agrostis, Oryza, 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
Rice has greatly reduced glumes and removing them to create a floret would be extremely time consuming. The spikelet of rice is the unit regarded as the seed in planting practices and in commercial channels. To comply with section 2.6, the spikelet of rice should be maintained, not reduced to a floret.

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29. PROPOSAL
Change in sample size for purity tests covered in section 2.3c of the Rules

PRESENT RULE
2.3 Weight of working samples
c. In samples that are believed to be unusally small-seeded or large-seeded for the kind being tested.--The size of the purity working sample may be based on a sample containing no less than 2,000 seeds without regard to the weight specified in Table 1, provided that in no case shall less than one-fourth gram be analyzed.

PROPOSED RULE
2.3

c. In samples that are believed to be unusally small-seeded or large-seeded for the kind being tested.--The size of the purity working sample may be based on a sample containing approximately 2,500 seeds without regard to the weight specified in Table 1, provided that in no case shall less than one-fourth gram be analyzed.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE
This proposal would make the purity amount in 2.3c consistant with the figure given in 2.3b. Purity analysis tolerances for AOSA (also ISTA and FSA) are all based on 2,500 seed sample size. If there is variation in the size of samples analyzed, then the established tolerances would not be applicable.

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30. PROPOSAL
Illustrate calculations for 400-1,000 seed separation on kinds or varieties in the Rules

PRESENT RULE
Last paragraph of 2.5c (Separation of similar kinds or cultivars):
For examples of calculations of 400-1,000 seed separations, see U.S. Dep. Agr. Agrl. Handk. No. 30, "Testing Agricultural and Vegetable Seeds," pages 58 and 70.

PROPOSED RULE
Replace the last paragraph of 2.5c with the following:
The following examples illustrate the procedure and method of calculating the results of 400-1,000 seed separations.
Examples --
(1) 1,000 seed separation of Avena spp. (total percentage of oats in regular purity analysis = 98.79%)

	Weight in grams	Percent		Percent of sample
944 seeds A. sativa variety A	23.91	94.43 x 98.79	=	93.29
39 seeds A. sativa variety B	0.99	3.91 x 98.79	=	3.86
17 seeds other Avena spp.	0.42	1.66 x 98.79	=	1.64
	25.32			98.79

(2) 1,000 seed separation of Poa spp. (total percentage of bluegrass in regular purity analysis = 88.09%)

	Weight in grams	Percent		Percent of sample
430 seeds P. pratensis	0.1209	56.55 x 88.09	=	49.81
568 seeds P. compressa	0.0925	43.26 x 88.09	=	38.11
2 seeds Poa spp. (naked caryopses)	0.0004	0.19 x 88.09	=	0.17
	0.2138			88.09

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

Since Handbook 30 is out of print and no longer available, references to this publication in the Rules should be eliminated where possible. Examples on pages 58 and 70 of Handbook 30 should be placed directly in the Rules. These two examples have been modified slightly for clarification.

SUBMITTED BY

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31. PROPOSAL

Change in example for application of tolerances on 400 seed examination of sweetclover (Melilotus sp.) under section 5.4 on page 103

PRESENT RULE

Examples --

b. Mottled-seed test of sweetclover

(1) Test results.--Pure sweetclover = 98.90%; in a 400-seed examination, weighing 0.710 grams, there were 12 mottled seeds, weighing 0.020 grams.

(2) Calculation of tolerance

$$\frac{\text{Weight of nonmottled seed}}{\text{Weight of seeds examined}} \text{ or } \frac{0.690}{0.710} = 97.18\%$$

Tolerance on 400-seed examination ($\frac{400}{400}$ column) for 97.18% = 2.00%

½ pure seed tolerance for 98.90% = 0.32%

Total tolerance 2.32%

(3) Application of tolerance

Tolerance is applied to percent white sweetclover after consideration of the 4X factor and correction for the percentage of sweetclover seed in the sample.

Thus: % mottled seed = $\frac{.020}{.710} = 2.82\%$

2.82 x 4 = 11.28
11.28 x 98.90 = 11.16% yellow sweetclover
98.90 - 11.16 = 87.74% white sweetclover
Tolerance is applied to 87.74%

PROPOSED RULE

Examples --

b. Chemical test for sweetclover

(1) Test results.--Pure sweetclover = 98.76%; in a 400-seed examination, 368 seeds or 92% stained olive or yellow-green (white sweetclover) and 32 seeds or 8% stained dark brown or black (yellow sweetclover).

(2) Calculation of tolerance

(a) Tolerance for 92% olive or yellow-green seeds ($\frac{400}{400}$ column) = 3.4%

½ pure seed tolerance for 98.76% = 0.32%

Total tolerance 3.72%

(b) Tolerance for 8% dark brown or black seeds ($\frac{400}{400}$ column) = 4.2%

½ pure seed tolerance for 98.76% = 0.32%

Total tolerance 4.52%

(3) Application of tolerance

% white sweetclover = 92% x 98.76% = 90.86%

% yellow sweetclover = 8% x 98.76% = 7.90%

The tolerance for 90.86% white sweetclover is 3.72%.

The tolerance for 7.90% yellow sweetclover is 4.52%.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE

The mottled-seed test for sweetclover in section 3.4 has been replaced by a chemical test method. The current example for calculation and application of tolerance on the mottled-seed test in section 5.4 is therefore no longer applicable. It should be replaced with an example illustrating results obtained by the chemical test to distinguish seeds of sweetclover. Numbers and percentages used in the example correspond to the ones used in section 3.4.

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32. PROPOSAL

Change in wording of fourth paragraph in section 5.2 (Purity Tolerances)

PRESENT RULE

A mixture shall be considered chaffy if the total of all chaffy seeds is 33 percent or more. If a sample is classed as nonchaffy, Table 8 or column C of Table 6 shall be used for all components regardless of whether the component being considered is nonchaffy or chaffy. Likewise, if a sample is classed as chaffy, Table 9 or column D of Table 6 shall be used for all components.

PROPOSED RULE

A mixture shall be considered chaffy if the total of all chaffy seeds is 33 percent or more and nonchaffy if the total of all chaffy seeds is less than 33 percent. If a sample (unmixed seed or a mixture) is classed as nonchaffy, all components shall be considered nonchaffy. Likewise, if a sample is classed as chaffy, all components shall be considered chaffy. For nonchaffy samples, use column C of Table 6 for unmixed seed and components of mixtures in which the particle-weight ratio is 1:1 to 1.44:1. Use Table 8 for components of nonchaffy mixtures in which the particle-weight ratio is 1.45:1 to 19.9:1. Likewise, for chaffy samples, use column D of Table 6 for unmixed seed and components of mixtures in which the particle-weight ratio is 1:1 to 1.44:1. Use Table 9 for components of chaffy mixtures in which the particle-weight ratio is 1.45:1 to 19.9:1.

SUPPORTING EVIDENCE OR REASONS FOR THE PROPOSED RULE:

This change in wording is needed to clarify which tolerance table to use for components of mixtures.

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