

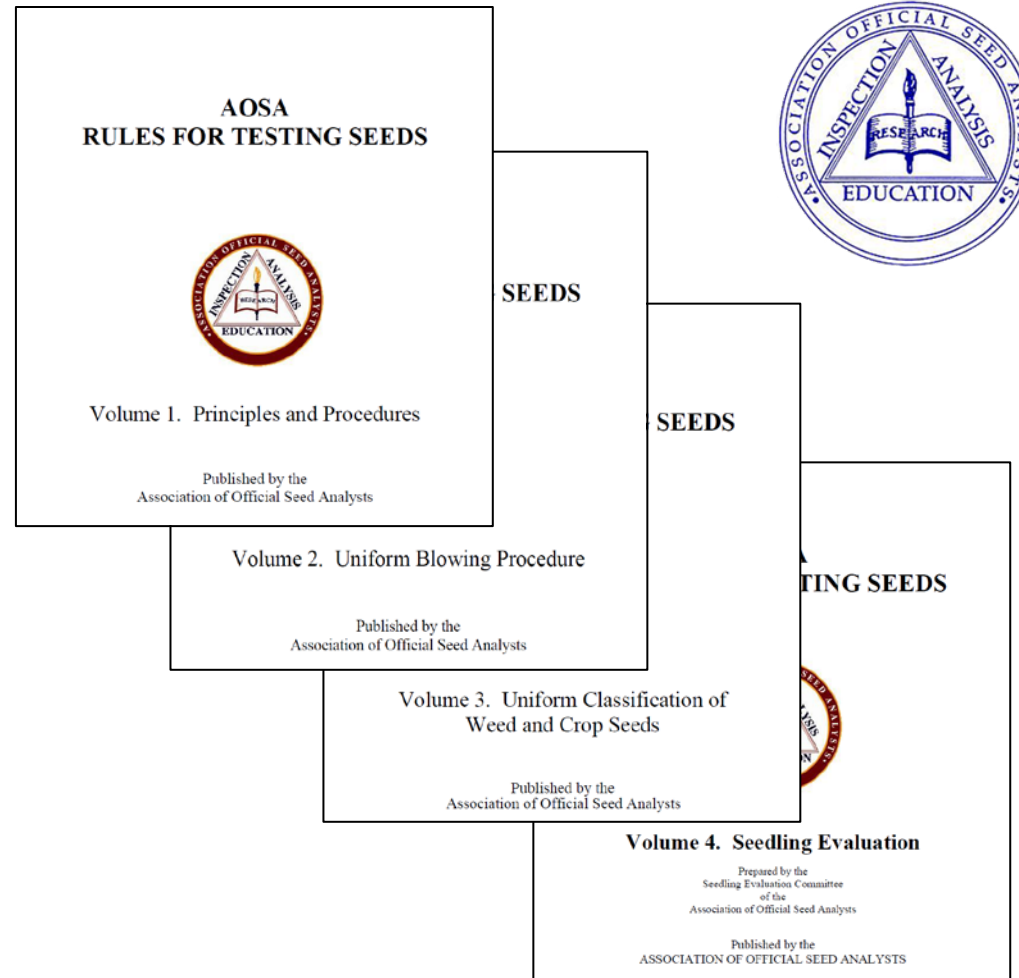
Seed Testing Procedures



Russell Wilhelm
Seed Program Manager

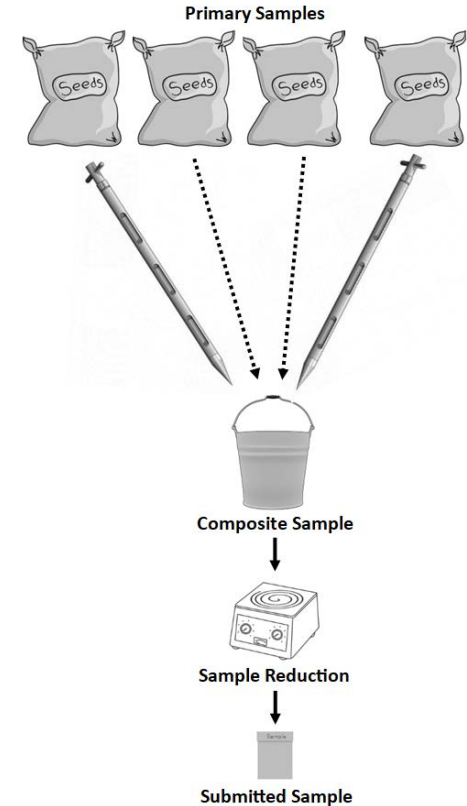
Rules for Testing Seeds

- **The Association of Official Seed Analysts (AOSA)**
 - Publish rules for testing seed;
 - Reviewed & evaluated annually;
 - Testing methods provided to all associated labs;
 - Methods have been established for 1000s of different species.



Test Requesting, Sampling & Fees

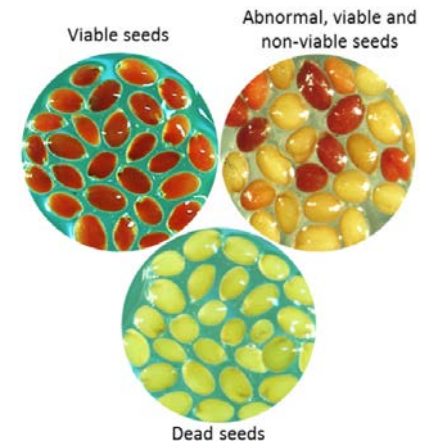
- To request a test with the NDA seed lab, fill out the:
"Request for Seed Test"
 - Found on NDA website below
- List of fees and required sample sizes per species can be found online as well.
- Ensure that you provide a sample that is reflective of the current lot conditions
- Website URL:
https://agri.nv.gov/Plant/Seed_Certification/Seed_Laboratory



***Certified seed sampling is also available through the NV Department of Agriculture**

Types of Tests Performed

- **Standard tests include:**
 - Purity Analysis
 - Determines the percentage by weight of pure seed, other crop seeds, inert matter and weed seeds in a test sample.
 - Germination Analysis
 - Determines the percentage of live seeds that produce **normal seedlings** under favorable germination conditions.
 - Noxious Weed Analysis
 - This test reports the name and number of any noxious weed seeds found in a test sample (minimum 25,000 seeds) based on the Federal all-states noxious-weed seed requirements.
- **Other common tests:**
 - Bulk analysis
 - Tetrazolium analysis*
 - Biochemical viability test which determines the # of live seeds in a lot based on dehydrogenase activity in seeds.
 - Moisture content
 - GMO Assay (*Alfalfa only*)



Germination Testing Factors to Consider



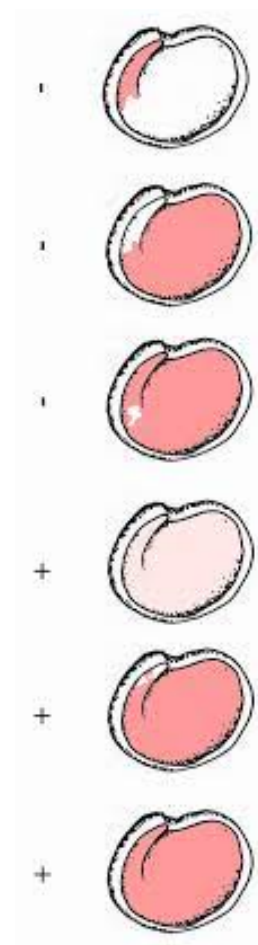
Certain species are designated to require special treatment prior to the germination test occurring. These treatments are typically prescribed to beat dormancy, but can be quite time-consuming.



Species Name	WW (P)	WW (NW)	Substrata	Germ Temp (°C)	First Count	Final Count	Special Requirements	Dormant Seed
Indian Ricegrass (<i>Achnatherum hymenoides</i>)	7.00 Grams	70.00 Grams	P	15	7	42	None	Prechill at 5°C for 4 wk & test for 21 additional days
Great Basin Wildrye (<i>Leymus cinereus</i>)	8.00 Grams	80.00 Grams	P	15 - 25	10	21	None	
Sandberg Bluegrass (<i>Poa secunda</i>)	1.20 Grams	12.00 Grams	P	20 - 30	7	21	Light; KNO3	
Squirreltail (<i>Elymus elymoides</i>)	9.00 Grams	90.00 Grams	P, B	15 - 20	10	14	None	
Bluebunch Wheatgrass (<i>Pseudoroegneria spicata</i>)	8.00 Grams	80.00 Grams	P, T, B	15 - 25	7	14	Light; KNO3	KNO3 and prechill at 5 or 10°C for 7 days
Slender Phlox (<i>Microsteris gracilis</i>)	5.00 Grams	50.00 Grams	TB, P	15	6	16	None	KNO3 may help sensitive new crop seed
Whitedaisy Tidytip (<i>Layia glandulosa</i>)	3.00 Grams	30.00 Grams	TB, P	10 - 15	4	8	Light	New crop seed may require 10°C (dark)
Rough Eyelashweed (<i>Blepharipappus scaber</i>)	3.00 Grams	30.00 Grams	TB, P	10 - 15	4	8	Light	New crop seed may require 10°C (dark)
Western Yarrow (<i>Achillea millefolium</i>)	0.40 Grams	4.00 Grams	TB	20 - 30	7	14	Light	
Small Burnet (<i>Sanguisorba minor</i>)	25.00 Grams	250.00 Grams	B, T	15	5	14	None	
Thickspike Wheatgrass (<i>Elymus lanceolatus</i>)	15.00 Grams	150.00 Grams	P	15 - 25	10	21	None	
Siberian Wheatgrass (<i>Agropyron fragile</i>)	15.00 Grams	150.00 Grams	P	15 - 25	5	28	Light	KNO3 and prechill at 5 or 10°C for 5 days

Tetrazolium Testing Procedures

- **Procedures for tetrazolium "TZ" testing are prescribed within an alternative handbook published by AOSA, "Tetrazolium Testing Handbook"**
 - Categorizes testing methods into family units.
 - Some families have 1-3 separate groups (*broken down by Genus*) for testing methods.
 - Testing strategies vary based upon the overall physiology of each particular seed species.
 - Some seed species possess morphological distinctions that make tetrazolium testing difficult.
 - For the most part, tetrazolium tests can be quite reliable if done correctly.
 - Will not provide viability results accounting for "normal seedlings," like a standard germination test
 - Most TZ tests can be completed in <3 days.



TZ Testing Methodology

AOSA/SCST TETRAZOLIUM TESTING HANDBOOK, 2010 Edition

FAMILY: POACEAE Group 1

Genera: *Avena*, *Hordeum*, *Oryza*, *Secale*, *Triticale*, *Triticum*

1. PRECONDITIONING:

METHOD	TIME (h)	TEMP (°C)
Imbibe on or between moist media	16-48	5-10

Morphology



Triticum

Fig 1 External

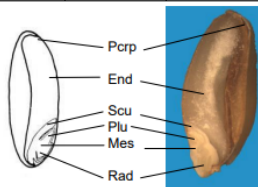
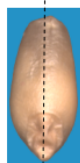


Fig 2 Embryo

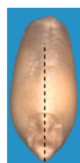
Notes: Endosperm imbibition is slower than radicle/plumule imbibition. Some *Oryza* endosperm may take up to 48 hours to completely soften. If the scutellum, plumule, radicle, and most of the endosperm is softened, seeds may be bisected before complete endosperm imbibition since endosperm tissue is nonliving and will not affect evaluation.

2. PREPARATION AND STAINING:

METHOD	TZ Conc (%)	TIME (h)	TEMP (°C)
Bisect longitudinally and retain half for staining, or cut longitudinally leaving seed intact at distal end or leaving enough endosperm or pericarp intact to keep both halves together	0.1	1-3	25-35



bisected



distal end intact



Fig 3 Preparation method

AOSA/SCST TETRAZOLIUM TESTING HANDBOOK, 2010 Edition

revised 2017

FAMILY: POACEAE Group 1

Genera: *Avena*, *Hordeum*, *Oryza*, *Secale*, *Triticale*, *Triticum*

Post-staining notes: For seeds with both halves attached, bisect or spread halves apart to view embryo.

3. EVALUATION:

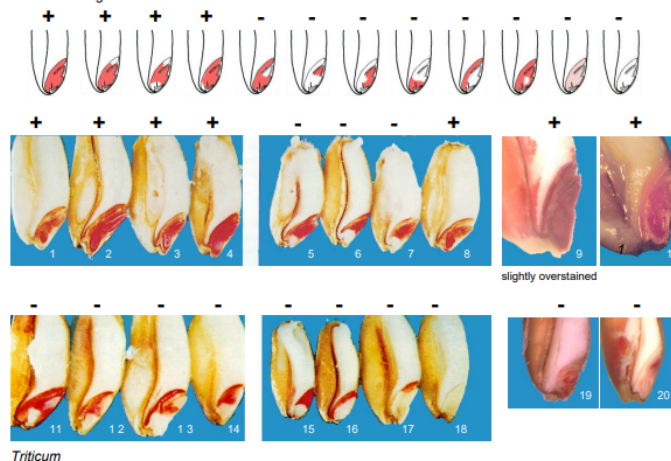
VIALE (NORMAL STAINING)

- at least 1/4 of radicle stained near mesocotyl
- embryo axis completely stained
- plumule and coleoptile completely stained
- endosperm is non-living and will not stain
- no more than 1/2 of scutellum unstained at either end
- a thin, white-colored, superficial layer over scutellum (see sections 14.2 and 15.1.3)
- mechanical damage not affecting essential parts of embryo
- point of attachment of embryo axis to scutellum stained

NON-VIALE (ABNORMAL OR NO STAINING)

- more than 1/4 of radicle unstained (begin measurement from tip and move towards mesocotyl)
- embryo axis less than completely stained
- plumule and coleoptile less than completely stained
- more than 1/2 of scutellum unstained at either end
- mechanical damage affecting essential parts of embryo
- point of attachment of embryo axis to scutellum unstained

Notes: Weak/damaged tissue will stain dark red and frost-damaged tissue will stain light in comparison to normal staining pattern. The aleurone (a layer of cells just underneath the pericarp) may or may not stain and has no bearing on evaluation.



Triticum

Fig 4 Seed stain evaluation

See following page for additional evaluation photos.

Hordeum vulgare



Typical minimum
of seeds
tested/lot is 200

Test Reporting



Nevada Department of Agriculture
405 S. 21st St.
Sparks, NV 89431

Seed Laboratory Report of Analysis

Warranty: We warrant that the test results reported on this form have been carried out with AOSA rules used as a guideline unless otherwise specified. Test results reflect the condition of a submitted sample and may not reflect the condition of the seed lot from which the sample was taken. Officially drawn samples represent the condition of the lot at the time of sampling.

Warranty: We warrant that the test results reported on this form have been carried out with AOSA rules used as a guideline unless otherwise specified. Test results reflect the condition of a submitted sample and may not reflect the condition of the seed lot from which the sample was taken. Officially drawn samples represent the condition of the lot at the time of sampling.

Test No: XXXXX001

Date Received: 3/9/2022

Date Reported: 3/23/2022

DISCLAIMER OF WARRANTIES: WE MAKE NO OTHER WARRANTIES OF ANY KIND, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

The Name of the Nevada State Seed Laboratory must not be used for advertising purposes in connection with this test.

Sender's Information:

Name: Nonexistent Seed Company Phone Number: (775) 867-5309
Address: 1478 Nonyabusin Drive Email: notgonnatellya@gmail.com
Reno, NV 89511

Kind of Seed: Sandberg Bluegrass (*Poa secunda*) Class: Source Identified
Variety: N/A Lot Number: 1234-852
Treated? Yes No Treatment: N/A Pounds: 1,250

Tests Required:

Purity: Germination: Noxious Weed: TZ:

Information in the above box is to be provided by the sender



Purity analysis:

Pure seed components in: 1.35 grams
Sandberg Bluegrass/*Poa secunda* 95.50 %
Weed Seed 2.50 %
Crop Seed 0.00 %
Inert Matter 2.00 %
Total 100%

Other Crop Seeds:
None found

Weed Seeds:
Bromus tectorum 125 seeds/lb.

Remarks: Inert matter consisted of broken seed & debris.

Seed Analyst: Russell Wilhelm
Russell Wilhelm

Seed Program

Office: Fora

Phone: 775.353.3711

Fax: 775.353.3638

Email: rwilhelm@agri.nv.gov

Viability analysis:

Germination %	Dormant %	Hard %	TZ %
<u>82.00</u>	N/A	N/A	<u>88.00</u>

Noxious Weed Examination:

Noxious Weed Seeds: None found

States: Nevada
In 13.65 grams

(P) Prohibited in NV. (R) Restricted in NV.

Other Determinations:

Germination test performed over a period of 21 days, with light and prescribed KNO3.



Conclusions

- **NDA Seed Lab can test most species**
 - Tests include:
 - Viability (germination/tetrazolium)
 - Purity
 - Noxious Weed
 - Moisture
 - Bulk exam
 - GMO (*Alfalfa only*)
- **Providing a representative sample is critical to test validity:**
 - Proportionate of the lot
 - Enough seed to perform all tests desired
 - Required sample sizes per species are listed online
- **Seed entering the commercial marketplace must comply with both federal/state requirements:**
 - [Federal Seed Act \(FSA\)](#)
 - [Nevada Revised Statute, Chapter 587](#)
 - [Nevada Administrative Code, Chapter 587](#)
 - “Truth in Labeling” – Seed lots should have results indicating:
 - 1) **Germination %** 2) **Purity content** 3) **Noxious weed content**



Questions?



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