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

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

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.
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

**Hordeum vulgare**

**1. PRECONDITIONING:**

<table>
<thead>
<tr>
<th>METHOD</th>
<th>TIME (h)</th>
<th>TEMP (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imbibe on or between moist media</td>
<td>16–48</td>
<td>5–10</td>
</tr>
</tbody>
</table>

**Morphology**

Notes: Endosperm imbibition is slower than radicle/plumule imbibition. Some Oryzae 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:**

<table>
<thead>
<tr>
<th>METHOD</th>
<th>TZ Conc (%)</th>
<th>TIME (h)</th>
<th>TEMP (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>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</td>
<td>0.1</td>
<td>1–3</td>
<td>25–35</td>
</tr>
</tbody>
</table>

**Fig 4 Seed stain evaluation**

See following page for additional evaluation photos.

Typical minimum # of seeds tested/lot is 200
**Test Reporting**

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

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**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.

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<table>
<thead>
<tr>
<th>Test No:</th>
<th>XXXX0001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Received:</td>
<td>3/9/2022</td>
</tr>
<tr>
<td>Date Reported:</td>
<td>3/23/2022</td>
</tr>
</tbody>
</table>

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**Sender's Information:**

- **Name:** Nonexistent Seed Company  
- **Phone Number:** (775) 867-5309  
- **Email:** notgonnateellya@gmail.com

- **Address:** 1478 Nonyabusiness Drive  
- **City:** Reno, NV 89511

- **Kind of Seed:** Sandberg Bluegrass (*Poa secunda*)  
- **Variety:** N/A  
- **Lot Number:** 1234.852

- **Treated?** ☐ Yes □ No  
- **Treatment:** N/A  
- **Pounds:** 1,250

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**Tests Required:**

- **Purity:** X  
- **Germination:** X  
- **Noxious Weed:** X  
- **TZ:** X

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**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%

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**Viability analysis:**

- **Germination:** 82.00%
- **Dormant:** N/A
- **Hard:** N/A
- **TZ:** 88.00

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**Noxious Weed Examination:**

- **Noxious Weed Seeds:** None found

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**Remarks:** Inert matter consisted of broken seed & debris.

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**Seed Analyst:** Russell Wilhelm

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**Seeds Program:**

- **Phone:** 775.353.3711
- **Fax:** 775.353.3638
- **Email:** rwilhelm@agri.nv.gov

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

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**agri.nv.gov**
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?

Russell Wilhelm
Email: rwilhelm@agri.nv.gov
Office: (775) 353-3711
Mobile: (775) 750-5910

agri.nv.gov