2018 Rule Proposal 10

Purpose of Proposal: To change the final count for onions from 10 to 12 days.

Present Rule:

Table 6A. Methods of testing for laboratory germination.

<table>
<thead>
<tr>
<th>Kind of Seed</th>
<th>Substrate</th>
<th>Temperature (°C)</th>
<th>First count (days)</th>
<th>Final count (days)</th>
<th>Specific requirements and notes</th>
<th>Dormant seed</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><em>Allium cepa</em></td>
<td>onion</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Alternate methods</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Chemically treated, pelleted or film-coated</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>B, T, PP</td>
<td>20</td>
<td>6</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>20</td>
<td>6</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OT</td>
<td>20</td>
<td>6</td>
<td>10</td>
<td>See sec. 6.8r and sec. 6.9a</td>
<td></td>
</tr>
</tbody>
</table>

Proposed Rule:

Table 6A. Methods of testing for laboratory germination.

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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OT</td>
<td>20</td>
<td>6</td>
<td>12</td>
<td>See sec. 6.8r and sec. 6.9a</td>
<td></td>
</tr>
</tbody>
</table>

Harmonization and Impact Statement:
Currently, the final count for onions (*Allium cepa*) is 10 days in AOSA when tested in B, T, or PP (an alternative method is 12 days when planted in S). For ISTA the final count is 12 days for all media. In the Canadian M & P the final count is 14 days.

Supporting Evidence:
Some onions do not appear to reach the maximum potential germination on 10 days, especially those that have been pelleted and/or treated with certain chemicals. 14 days might be too long, but 12 days may be better than 10 days. Several analysts discussed this observation at the 2016 annual meeting. After the meeting, a referee was put together as a comparison of the 10 and 12 day final counts for onions. In addition, some in-house laboratory data was collected using commercial onion samples from three different seed companies.

The referee results were presented at the 2017 annual meeting. The difference between 10 and 12 days was not huge in most cases, but the results did show an improvement in germination results with the longer 12 day count. Increasing the germination to 12 days would also harmonize with ISTA. The following is a summary of the results:

- Overall, the average difference of the six samples and 8 labs was 1.94% between the 10 day and 12 day final counts.
• A nearly 2% difference shows that onion germination may not be reaching the maximum potential on the 10 day count.
• The evidence supports the idea of harmonizing with ISTA in using the 12 day final count for onions.
• The in-house data showed an average of 2.53% additional germination by adding the two days to the final count.
• These results further support the extension of onion final counts to 12 days and harmonizing with ISTA.

The complete referee results are included in the Appendix.

The following analysis was prepared by Riad Baalbaki of the Germination subcommittee:

2016 Onion Germination Referee Analysis of Results

Analytical Methods
• Germination data was arcsine transformed before analysis, to stabilize the variance.
• The paired t-test (dependent samples t-test) was used for all mean comparisons.
• One-way tests were used to determine if 12 day results were statistically higher than 10 day results.
• Simple correlation analysis was used to examine sample quality effects on differences between the two test periods.

Results
Extending the test period from 10 to 12 days produced significantly higher results for all tested samples, when results were averaged over all labs (Table 1).

<table>
<thead>
<tr>
<th>Sample</th>
<th>10 days</th>
<th>12 days</th>
<th>Difference</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>76.34</td>
<td>78.69</td>
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</tr>
<tr>
<td>2</td>
<td>75.53</td>
<td>77.88</td>
<td>2.35</td>
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</tr>
<tr>
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<td>83.25</td>
<td>2.47</td>
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</tr>
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</tr>
<tr>
<td>5</td>
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<td>88.94</td>
<td>1.91</td>
<td>Yes</td>
</tr>
<tr>
<td>6</td>
<td>88.19</td>
<td>89.84</td>
<td>1.65</td>
<td>Yes</td>
</tr>
</tbody>
</table>

As expected, samples of lower quality (lower percentage germination) benefitted more from extending the germination period. This was confirmed by correlating differences in germination between 10 and 12 days with 10 day germination results, resulting in a highly significant and negative correlation (-0.83).

Submitted by:
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Linda Barbosa, RST, Sakata Seed, Salinas, CA

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