**2023 Rule Change Proposal #9**

**Purpose of Proposal:** To add Quinoa (*Chenopodium quinoa*) purity weights and germination methods to the AOSA Rules Volume 1.

**Present Rule: New Rule**

**Proposed Rule:**

**Table 2A. Weights for working samples.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Pure Seed Unit #** | **Chaffy Seed a** | **Kind of seed** | **Minimum weight for purity analysis b** | **Minimum weight for noxious-weed seed or bulk examination** | **Approximate number of seeds per gram c** | **Approximate number of seeds per ounce d** |
| **Grams** | **Grams** | **Number** | **Number** |
| 38 | C | *Chenopodium quinoa* Willd.  quinoa | 7 | 70 | 367 | 10,805 |

**Table 6A. Methods of testing for laboratory germination.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Kind of seed** | **Substrata** | **Tempera-ture**  **(°C)** | **First count (days)** | **Final count (days)** | **Specific requirements**  **and notes** | **Dormant seed** |
| *Chenopodium quinoa*  quinoa | TB | 20;   15 | 4 | 7 |  |  |

**Harmonization and Impact Statement:**

In 2021 the testing procedures for *Chenopodium quinoa* were added to the ISTA Rules.

ISTA methods (effective 2022) are as follows:

Minimum weights – purity: 10 g; Other seeds: 100g

PSD 2 (achene)

Germination – TP, BP 20°C, 4 day first count, 7 day final count

This species is not included in the Canadian M&P or the Federal Seed Act.

**Supporting Evidence:**

Quinoa (*Chenopodium quinoa*) is an edible grain or pseudocereal which is increasing in use and therefore being tested in seed laboratories. ISTA added this species to their Rules in 2021. Analysts in the US were interested in adding this species to the AOSA Rules, and in 2021 a referee was conducted in order to gather data with the purpose of adding germination methods to Table 6A. The referee organizers were encouraged to compare **15°C** to **20°C** as part of this study, as some labs reported having success using the lower temperature. The referee design was approved by the co-chairs of the Germination subcommittee. Four lots of varying quality were sent to 12 laboratories, along with the germination media to be used (white blotters) in order to reduce a source of variability. Data from 11 labs completing the referee was compiled and analyzed. The following is a summary of the results:

**Average germination results for quinoa from 11 laboratories:**

|  |  |  |
| --- | --- | --- |
| **Sample** | **Tested at 20°C** | **Tested at 15°C** |
| 1 | 45.23 | 47.52 |
| 2 | 47.75 | 49.98 |
| 3 | 71.82 | 72.00 |
| 4 | 59.14 | 55.41 |
| Overall Average | **55.99%** | **56.23%** |

The raw data was analyzed by Dr. Riad Baalbaki of the California Department of Agriculture and AOSA co-chair of the Germination subcommittee. – his analysis is included as supporting evidence. The main findings from the data analysis indicate that 1) Samples had a range in quality; 2) Using either 15 or 20C as test temperature had no effect on final germination percent when averaged over all other factors; 3) With a single exception (lab 9 sample 4), no lab produced significantly different results when germination was evaluated at 15 and 20C; and 4) The extent of variability among labs depended on the sample being tested and was not effected by temperature.

Referee results were presented at the 2022 AOSA/SCST meeting in Skokie, IL. This PowerPoint presentation is also included as supporting evidence.

In addition, seed count data was collected in order to add purity weights to Table 2A. Thirteen lots of quinoa seeds (seven commercial samples and six germplasm samples from the USDA) were obtained and sampled for seed count information. The following table is a summary of the seed count data:

**Seed count data for quinoa:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sample Number | Origin | **1000 seeds (g)** | **Number of seeds per gram** | **Number of seeds per ounce** |
| 1 | Pacific Grain | 2.999 | 333 | 9,453 |
| 2 | Pacific Grain | 2.782 | 360 | 10,192 |
| 3 | Pacific Grain | 3.029 | 330 | 9,359 |
| 4 | Pacific Grain | 2.798 | 357 | 10,133 |
| 5 | Country Creek Acres | 2.420 | 413 | 11,716 |
| 6 | Botanical Interests | 2.952 | 339 | 9,602 |
| 7 | Botanical Interests | 3.072 | 326 | 9,230 |
| 8 | Chile | 1.960 | 510 | 14,464 |
| 9 | Colorado, USA | 2.373 | 421 | 11,946 |
| 10 | Chile, Maule | 2.660 | 376 | 10,659 |
| 11 | Chile, Pichilemu | 2.371 | 422 | 11,955 |
| 12 | Chile, Faro | 3.953 | 253 | 12,360 |
| 13 | Chile | 3.015 | 332 | 9,402 |
|  |  |  |  |  |
| **Average** |  | **2.799** | **367** | **10,805** |

Using this data, the average seed counts weights are as follows:

2,500 seeds = 6.998 grams

25,000 seeds = 69.98 grams

Minimum purity weights to add to the AOSA Rules should be 7 grams for purity and 70 grams for the noxious weed /bulk exam. (Note that this is somewhat lower than the weights added to the ISTA Rules in 2021.) The seed unit for this species is described as a utricle by Hortus Third (Bailey 1976), so the proper Pure Seed Unit for this species is PSU 38; the seed is chaffy.

**Submitted by:**

Sue Alvarez, RST, Ransom Seed Lab, Carpinteria, CA [sue.alvarez@ransomseedlab.com](mailto:sue.alvarez@ransomseedlab.com)

Linda Barbosa, RST, Sakata Seed, Morgan Hill, CA [lbarbosa@sakata.com](mailto:lbarbosa@sakata.com)

**Date submitted:** July 26, 2022