Abstracts

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One Size Does *Not* Fit All! Not All Native Seed Weights for Purity Are Equal

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This seed issue was presented to raise awareness of purity/noxious weights for native seeds presently in the AOSA Rules Volume 1, Table 2A, as well as new proposed weights for native species that will be added to AOSA Rules Volume 1, Table 2A, in October 2015. The requirement of approximately 2500/25,000 seeds for purity/noxious weights in Table 2A (AOSA, 2014) was determined before the testing of native seed became prevalent. This requirement for a purity working weight has created issues with many native seed samples for testing, especially samples of Asteraceae and Poaceae. When native seed samples have a low percentage of pure seed and a large percentage of inert matter and/or contaminants, the question of reducing the purity weight becomes more relevant. There is a time factor in testing purity which is directly related to the cost of the test. In addition, our test results have shown that percentages of pure seed of the reduced purity weight compared to the required purity weight were in tolerance. Why then should it be necessary to do more, when less achieves the same results? Presently, there are several native seed species in the AOSA Rules Volume 1, Table 2A, where this issue arises, including *Achillea millefolium* L., *Artemisia tridentata* Nutt., and *Gazania rigens* (L.) Gaertn. Fifteen more native species have been added to the AOSA Rules, including *Deschampsia cespitosa* (L.) P. Beauv. and *Lasthenia californica* DC ex Lindl., beginning in October 2015. This same issue of the time factor related to the cost and tolerance of pure seed (reduced weight versus required weight) still exists. The purity weight requirements for native seed species need to be flexible enough to accommodate high inert matter and/or contaminant percentages. Instead of adding fixed purity/noxious weights based on seed counts to the AOSA rules, more flexible proposed weights could be added to a Native Seed Testing Handbook. Weight ranges could be proposed specifying minimum and maximum purity weights and listed in the Native Seed Testing Handbook. The minimum/maximum purity weights would directly address the time factor related to cost of the test.

REFERENCE

AOSA, 2014. Rules for testing seeds, Vol. 1. Principles and procedures. Assoc. Offic. Seed Anal., Washington, DC.

MD Seed Analysis, Inc. P.O. Box 40335, Santa Barbara, CA 93140 (mdsa@cox.net). Received 23 September 2015.

Statistical Sampling Variability in ELISA Trait Purity Testing

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A statistical study was conducted to illustrate the effect of sampling variability in trait purity testing by ELISA (enzyme-linked immunosorbent assay). Trait purity testing is routinely performed on a seed lot to estimate the percentage of seeds that contain a specific trait expressed through the production of a specific protein, such as a Bt insect resistance protein. Trait providers establish strict acceptance criteria for trait purity testing to ensure that samples meet minimum trait purity quality standards; the presence of even a few negative results on a 90-seed test can result in the failure of a seed lot to meet standards. The statistical tool Seedcalc8 (Remund et al., 2007) was used to calculate the 2-sided confidence interval (CI, $p \leq 0.05$) for true percentage purity of a seed lot, based on the number of seeds tested and number of trait-negative seeds detected in the test. The CI was determined for a range of theoretical test results (e.g., 1 negative/90 seed test, 2 negative/90 seed test, etc.). Next, results from 2,588 samples previously sampled and extracted in triplicate, and tested by ELISA at Eurofins BioDiagnostics, were analyzed. The variability of observed purity among the three sampling replicates for each sample was measured and found to be within the calculated statistical purity range determined by Seedcalc8 for 92.42% of the samples. Samples that fell outside the 95% CI met the trait purity requirement and were above the upper limit. The study demonstrated that the accuracy of the trait purity estimate for a seed lot increased as the number of seeds tested increased, and that the variability of the trait purity estimate increased with trait impurity (i.e., the number of trait-negative seeds detected in a test). Most trait providers recommend testing more seeds when a seed lot does not pass the initial 90-seed test. This statistical analysis demonstrated why it is beneficial to incrementally increase sample size from 90 to 360 seeds to get the best estimate of percentage trait purity. As with all seed testing, the accuracy of the test depends not only on the number tested, but also on the quality of the sample. A sample that is not representative of the seed lot will not help a seed producer determine the true quality of their seed.

REFERENCE

Remund, K., R. Simpson, J. Laffont, D. Wright and S. Gregoire. 2007. Statistical tools for seed testing: Seedcalc8. Int. Seed Test. Assoc., Bassersdorf, Switzerland. Retrieved from http://www.seedtest.org/en/statistical-tools-for-seed-testing-_content---1--1143--279.html (verified 19 May 2016).

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