


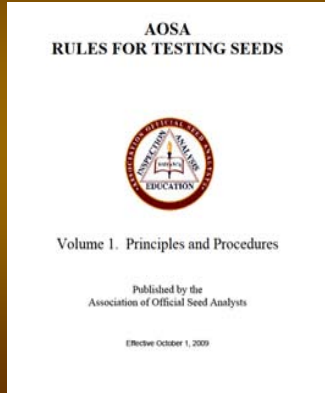
## NIST HANDBOOK 133 New Procedure for Testing Seed Count

**A Call for Repeal of  
 Action Taken at 95<sup>th</sup> Annual Meeting of  
 National Conference on Weights & Measures  
 Re:  
 Testing Procedures for Seed Count**

Presented By  
 Kurt Floren  
 Director of Weights & Measures  
 County of Los Angeles, California



## Association of Official Seed Analysts "Rules for Testing Seeds"



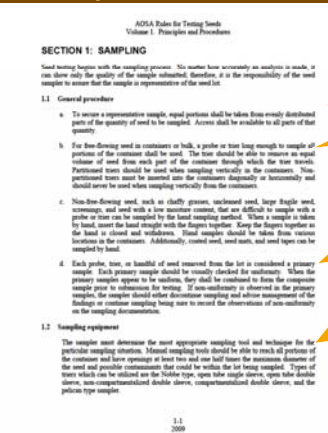
AOSA: Official nationwide association of seed analysts, formed in 1908 in response to actions by individual states to develop seed laws.

Members include state, federal & university seed labs of U.S. and Canada.

Primary Functions:

- Establish AOSA Rules for Testing Seeds, adopted by most states as seed rules
- Contribute to refinement & modification of rules and procedures for seed testing
- Ensure procedures are standardized between analysts and between labs
- Influence and assist in enforcement of appropriate seed legislation at state and federal levels

## Procedure does **NOT** start with simple count of 10 groups of 100



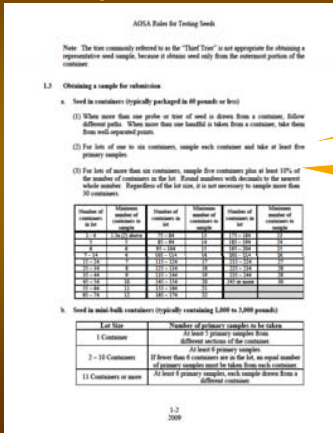
To secure a representative sample, **equal portions shall be taken from evenly distributed parts...**

...a probe or trier... shall be used... able to remove an equal volume... from each part of the container...

Each probe, trier, or handful... is considered a primary sample. Each should be visually checked for uniformity.

...determine the most appropriate tool and technique... Manual sampling tools should be able to reach all portions of the container and have openings at least 2½ times the maximum diameter of... seed and possible contaminants...

## Procedure does **NOT** start with simple count of 10 groups of 100



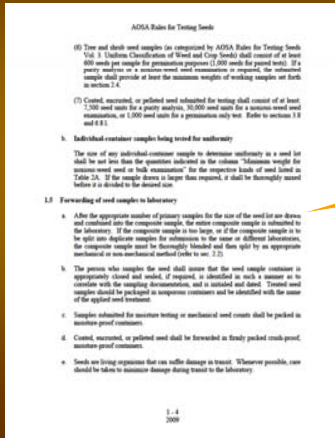
For lots of one to six containers, sample each... take at least five primary samples

For lots of more than six containers, Sample five... plus at least 10% of the number of containers in the lot. (up to 30 primary samples)

Samples are drawn to form composite sample.

All of this is required for Purity Analysis

## Procedure Requires Lab Analysis



After...appropriate number of primary samples...are drawn and combined into the composite sample, **the entire sample is submitted to the laboratory**

As you will see, the procedure adopted into Hdbk 133 requires Purity Analysis testing by a seed analysis laboratory

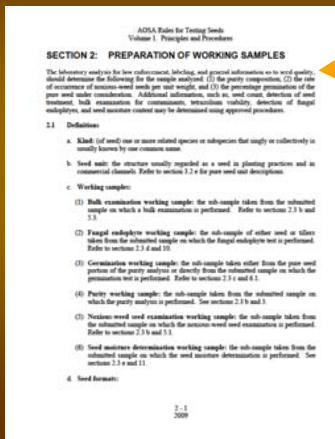
## Why be concerned with portions not adopted into Hdbk 133?



This **entire handbook** shall be considered part of the Rules and **its use is required** for determination of classification of the kind of seed under consideration and classification of weed and crop seed contaminants for **purity testing**

Purity Testing is a requisite part of procedure adopted by NCWM

## Seed Count Testing Procedure References AOSA "Rules" § 2.2

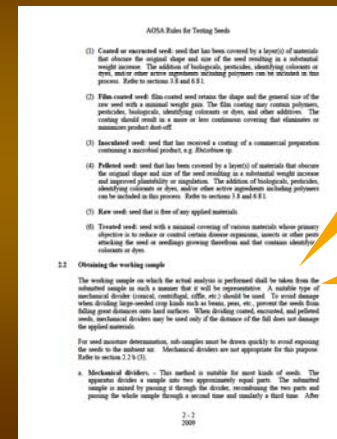


The laboratory analysis for law enforcement, labeling... should determine the following:

- (1) the **purity composition**
- (2) the rate of...noxious-weed seeds
- (3) the percentage germination...

By making reference to Section 2.2 **and Section 1.2 adopted by NCWM**, all of Section 2 must be followed to ensure that seed count verification testing is defensible under legal challenge (i.e., defense in prosecution)

## Seed Count Testing Procedure References AOSA "Rules" § 2.2



The working sample... **shall be taken from the submitted sample**

"Submitted sample" means that submitted to the **seed laboratory** (recall Section 1.5)

A suitable type of **mechanical divider** (conical, centrifugal, riffle, etc.) **should be used**

Mechanical dividers are costly, sensitive pieces of equipment that Weights & Measures agencies do not possess

## Examples of Mechanical Dividers



Preliminary research  
re: cost of  
**Centrifugal Divider:**  
**\$2400 - \$3000**

Centrifugal divider photos from  
AOSA presentation to IPSA

Dividing seed with mechanical divider



Dividing seed with mechanical divider



← **Riffle Divider:** ~ \$400 - \$700

**Boerner Divider:** ~ \$1500 - \$1600 ▶



## Pure Seed Sample: Required for Count Testing

Volume 1: Principles and Procedures

Particle analysis	Percent by weight
Common weeds	0.1-1.0
Other crop seeds	1.0-5.0
Soil matter	0.2-1.0
Inert matter	0.0-0.5

Kind	Weight of sample	Percent of sample
100 common seeds (7500 net wt. 10000)	10.00	0.100
1000 common seeds (7500 net wt. 10000)	10.00	0.010
20000 common seeds (7500 net wt. 10000)	10.00	0.002

For 400, 800, or 1000 seed separation tolerances refer to section 11, Table 11E.

For determining the rate of acceptance of any accession seed species that are similar in appearance to the kind or cultivar under consideration, refer to section 1.1.

8.2 Kind or cultivar considered pure seed. The pure seed shall include all seed units of each kind or cultivar and cultivar under consideration present in more than five percent of the whole. Kinds or cultivars and cultivars present to the extent of five percent or less of the whole may be considered pure seed if shown on a label as components of a mixture in amounts of five percent or less.

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The **pure seed** shall include all seed units of each kind or each kind and cultivar under consideration...

Identification / determination of a **PURE SEED** sample is critical to the procedure and to demonstration of compliance with the Hdbk 133 procedure...

Are W&M field officials trained, qualified, certified?

## Purity Analysis: Only The Basics

AOSA Rules for Testing Seeds  
Volume 1: Principles and Procedures

**SECTION 3: THE PURITY ANALYSIS**

3.1 The purity analysis.

The objective of a purity analysis is to determine the physical composition of the working sample. The analysis shall include the identification of the kind, or kind and cultivar of seed under consideration, and all contaminating species and inert matter.

a. The purity working sample shall be separated into the following components: (1) kind or cultivar to be considered pure seed, (2) other crop seed, (3) inert matter, and (4) weed seed. The component shall be weighed or given to the same number of decimal places as the working sample, except as provided for in section 3.1 b (2) when it is not necessary to weigh the pure seed component.

Additional instructions for the components may include visual examination, magnification, use of transmitted light (light microscopy), specific gravity (seed floaters), or x-rays. Specific instructions for classification are to be given under other crop seed, inert matter, and weed seed per section 3.2 through 3.7. For common, restricted, or preferred seeds refer to section 3.8. Insects or other pests, and saprophytic fungi, classification as to weed or other crop seed shall be as specified in section 4. Specific instructions for reporting purity analysis results are given in section 14.

b. Calculation of component percentages.

(1) The percentage of each of the four components shall be determined to two decimal places.

(2) Minimum purity working sample less than 20 grams: Percentages shall be based on the sum of the weights of all the components and not on the original weight based on the sum of the weights of the components shall be computed with the original weight of the working sample as a check against loss of material or other factors.

(3) Minimum purity working sample of 20 grams or more: The other crop seed, inert matter, and weed seed shall be weighed and their percentages calculated on the basis of the original weight. The pure seed and its weight, its percentage may be determined by subtracting the sum of the percentages of the other three components from 100.

(4) When rounding off the calculated percentages of each component to the second decimal place, round down of the third decimal place to 4 or less and round up if the third decimal place is 5 or more, except that if any component is determined to be present in any amount calculated to be less than 0.01 percent, then that component shall be reported as 0.01 percent. If any component is not found in the purity analysis, then that component shall be reported as 0.00 percent.

3-1  
2009

...purity analysis... determine the physical composition of the working sample. The analysis shall include the identification of the kind... of seed under consideration, and all contaminating species and inert matter

The purity working sample shall be separated into the following components:  
(1) kind or cultivar to be considered pure seed  
(2) other crop seed  
(3) inert matter, and  
(4) weed seed

Requires seed identification expertise not possessed by most W&M officials

## Can't we just count 1,000 seeds?

RECALL:

AOSA Rules for Testing Seeds  
Volume 1: Principles and Procedures

**SECTION 4: UNIFORM CLASSIFICATION OF WEED AND CROP SEEDS**

For classification of weed and crop seeds, refer to AOSA Rules for Testing Seeds, Volume 1, Uniform Classification of Weed and Crop Seeds, AOSA 2009, and subsequent updates. This entire handbook shall be considered part of the Rules and its use is required for determination of classification of the kind of seed under consideration and classification of weed and crop seed contaminants for purity testing.

4.1 Classification of all contaminating species shall be based on the species classification except as the kind or cultivar under consideration. To determine the appropriate classification of a contaminating species:

a. Under the name of each kind or cultivar under consideration determine the species classification, see volume 1 crop seeds, AOSA 2009, in the classification section of Volume 1. Species classification will be assigned to one or more of the following categories: appropriate (A), flower (F), leaf (L), or vegetative (V).

b. Under the name of the contaminating species that the classification (leaf, seed or crop) in the corresponding volume of contaminating classification based on the species classification (A, F, L, V, or V) to the kind under consideration. See page 9 of Volume 1 for an example.

c. For exceptions to the classification system see items 2, 3 and 5, on page 9, of Volume 1.

d. For guidelines on the classification of contaminating species found in the purity analysis of a single kind with multiple species classifications or in mixtures of kinds with different species classifications, see page 9, item 4, of Volume 1.

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2009

This **entire handbook** shall be considered part of the Rules and its use is required for determination of classification of the kind of seed under consideration and classification of weed and crop seed contaminants for purity testing

The procedure adopted by NCWM specifically requires calibration of mechanical seed counter using seed from a **Pure Seed** sample.....

Section 12.4: "After the seed counter has been calibrated, test the pure seed portion from the purity test..."

## Section 12 of “Rules for Testing Seeds” Directly Adopted in NCWM Action



The following method **shall be employed** when using a **mechanical seed counter**...

Samples shall be retained in moisture proof containers until the weight of the sample prepared for **purity analysis** is recorded.

...after opening the moisture proof container, **mix and divide** the **submitted sample**, **in accordance with section 2.2**, to obtain a sample for **purity analysis**

**Conduct the purity analysis** to obtain pure seed for the seed count test

Can there be any question that we are bound by the entire AOSA procedure?

## Examples of “Pure Seed” Criteria

For Field Bean and Soybean:

- Seed with at least a portion of the seed coat attached
- Broken seed larger than one-half the original size with at least a portion of the seed coat attached
- For Fabaceae (*includes Field Bean & Soybean*): Cotyledons that are broken apart but held together by the seed coat shall be classified as pure seed. Cotyledons that have separated and are not held together by the seed coat are regarded as inert matter irrespective of whether or not the radicle-plumule axis and/or more than half of the seed coat may be attached.
- Wing, when present, is removed and considered inert matter.
- Chalcid-damaged seeds in Fabaceae that are puffy, soft, or dry and crumbly are considered inert matter.

Weights & Measures officials should have no trouble....  
Right?

## Examples of “Pure Seed” Criteria

For Corn:

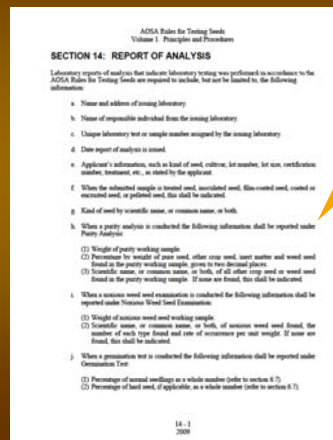
- Multiple floret, with or without awn, provided a caryopsis with some degree of endosperm development can be detected (either by slight pressure or by examination over light).
- Caryopsis or piece of broken caryopsis larger than one-half of the original size

Special Consideration:

- \* A fertile floret attached to another fertile floret shall be separated
- \* Attached glumes and empty florets shall be removed and classified as inert matter.

Again, the average W&M official can do this....  
Right?

## Purity Analysis: Seed Identification



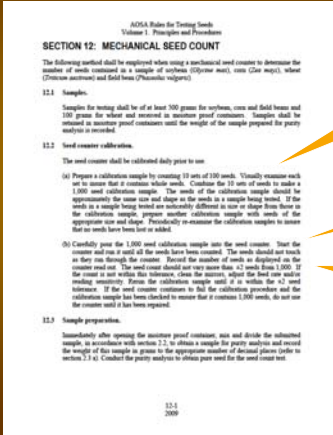
When a purity analysis is conducted, the following shall be reported under **Purity Analysis**:

- Weight of purity working sample
- Percentage..of pure seed, other crop seed, inert matter, and weed seed...
- Scientific name, or common name, or both, of all other crop seed or weed seed found...

Seed Analysts typically work 4-5 years in a seed laboratory to gain expertise to independently conduct seed analyses...

What percentage of Weights & Measures officials are qualified?  
ANY?

## Other Concerns: Repeatability?



Prepare a calibration sample by counting 10 sets of 100 seeds. Combine...to make a 1,000 seed calibration sample.

...pour...into the seed counter. ...run it until all seeds...counted. The seed count should not vary more than  $\pm 2$  seeds from 1,000.

If...not within this tolerance, clean...mirrors, adjust...feed rate and/or reading sensitivity. Rerun it until it is within the  $\pm 2$  seed count tolerance.

Calibration procedure mandates no steps to verify repeatability. Out-Of-Tolerance runs could be unlimited. Results may result in enforcement action: Defensible?

## Mechanical Seed Counter

(Photo from AOSA presentation to IPISA)



Seen one? Own one?

Not subject to transportation on front seat of a pickup truck!

Preliminary Cost Estimate: \$8,000

## Example of 100-Seed Sampling

(from AOSA presentation to IPISA)



Preparing calibration sample

Does this look like a field activity?

## Other Concerns: Equipment Access? Portability?



Loading and running calibration sample. (Photos from AOSA presentation to IPISA)

Use of mechanical seed counter is clearly not a field operation. Equipment and analysis procedures are laboratory activities.



## Call for Repeal of NCWM Adoption

Acknowledge:

1st: **We do need an accurate, reliable, consistent procedure for testing seed count.**

- Seed count is an important factor in farming to manage input costs & to meet needs of modern planting equipment
- Packers/Manufacturers are increasingly placing supplemental count statements on seed packages due to customer demand
- A procedure is needed by W&M to regulate labeled count accuracy

2nd: **AOSA standards are well developed and are in wide use by seed labs.**

**BUT: Procedure was prematurely adopted by NCWM.**  
- Procedure provides little assurance of counter accuracy.  
- We have adopted a **test procedure that few, if any, can actually perform!**

## Call for Repeal of NCWM Adoption

NOT suggesting that procedure is not needed....

But,

New NIST Hdbk 133 sections 4.2 and 4.11

- Require expertise not held by W&M inspectors
- Require equipment not suitable for field use
- Require equipment that is cost restrictive
- Require steps that, if not precisely followed, subject W&M agencies to legal challenges and, potentially, litigation exposure for taking off-sale action.

## Recommendation

WWMA should call on NCWM to:

Recognize that:

- State & local W&M agencies do not have required equipment
- State & local W&M agencies do not have required seed analysis expertise (licensing/certification)
- State & local W&M agencies are highly unlikely to have time (years for certification as seed analysts) or resources (\$\$) to meet requirements
- Adopted procedures do not facilitate field tests of seed count
- Adopted procedures will not result in enhanced enforcement due to all of above.

## Recommendation

WWMA should call on NCWM to:

Take the following actions:

- Rescind action taken to adopt amendments to Hdbk 133 Section 4.2 and to add Section 4.11 et seq
- Direct NCWM Laws & Regulations (L&R) Committee to establish a working group to conduct appropriate studies, field trials, laboratory testing, and other measures to establish procedures for verification of repeatability of Mechanical Seed Counter devices (at a minimum)
- Direct NCWM L&R Committee to establish a working group to research, develop, and recommend alternative seed count testing procedures that are practical and reliable for field applications (preferred)