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

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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

AOSA RULES FOR TESTING SEEDS

Volume 1. Principles and Procedures

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AOSA Rules for Testing Seeds
Volume 1. Principles and Procedures

SECTION 1: SAMPLING

Seed testing begins with the sampling process. No matter how accurately an analysis is made, it can show only the quality of the sample submitted; therefore, it is the responsibility of the seed sampler to assure that the sample is representative of the seed lot.

1.1 General procedure

a. To secure a representative sample, equal portions shall be taken from evenly distributed parts of the quantity of seed to be sampled. Access shall be available to all parts of that quantity.

b. For free-flowing seed in containers or bulk, a probe or trier long enough to sample all portions of the container shall be used. The trier should be able to remove an equal volume of seed from each part of the container through which the trier travels. Partitioned triers should be used when sampling vertically in the container. Non-partitioned triers must be inserted into the containers diagonally or horizontally and should never be used when sampling vertically from the container.

c. Non-free-flowing seed, such as chaffy grains, uncleaned seed, large fragile seed, screenings, and seed with a low moisture content, that are difficult to sample with a probe or trier can be sampled by the hand sampling method. When a sample is taken by hand, insert the hand straight with the fingers together. Keep the fingers together as the hand is closed and withdrawn. Hand samples should be taken from various locations in the container. Additionally, coted seed, seed mats, and seed tapers can be sampled by hand.

d. Each probe, trier, or handful of seed removed from the lot is considered a primary sample. Each primary sample should be visually checked for uniformity. When the primary samples appear to be uniform, they shall be combined to form the composite sample prior to submission for testing. If non-uniformity is observed in the primary samples, the sampler should either discontinue sampling and advise management of the findings or continue sampling being sure to record the observations of non-uniformity on the sampling documentation.

1.2 Sampling equipment

The sampler must determine the most appropriate sampling tool and technique for the particular sampling situation. Manual sampling tools should be able to reach all portions of the container and have openings at least 2½ times the maximum diameter of the seed and possible contaminants that could be within the lot being sampled. Types of triers which can be utilized are the Noble type, open tube single sleeve, open tube double sleeve, non-compartmentalized double sleeve, compartmentalized double sleeve, and the pelican type sampler.
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.**
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.
The laboratory analysis for law enforcement, labeling, should determine the following:

1. **Purity composition**
2. The rate of noxious-weed seeds
3. The percentage germination

By making reference to Section 2.2 (in Section 12 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)
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

Riffle Divider: ~ $400 - $700

Boerner Divider: ~ $1500 - $1600
Purity Analysis: Only The Basics

...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.
Pure Seed Sample: Required for Count Testing

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?
Can’t we just count 1,000 seeds?

RECALL:

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

1. Weight of purity working sample
2. Percentage...of pure seed, other crop seed, inert matter, and weed seed...
3. **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?
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 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 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 IPSA)

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 IPSA)

Preparing calibration sample

Does this look like a field activity?
Other Concerns: 
Equipment Access?  Portability?

Use of mechanical seed counter is clearly not a field operation.

Equipment and analysis procedures are laboratory activities.

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