



Michigan Technical Note

USDA-Natural Resources Conservation Service

AGRONOMY #36

Subject: Understanding a Seed Lab Analysis Report

Date: September 2006

GENERAL INFORMATION

Seed quality is a primary consideration when purchasing seed for any agronomic, horticultural, or conservation planting. Seed quality consists of several factors including: purity, germination and dormancy, presence of inert materials, and other crop seed and weed seeds. Seed testing laboratories conduct standardized tests on seed lots to quantify those seed quality characteristics. The standardized tests are conducted under controlled environments to ensure accurate and repeatable results. Upon completion of a seed analysis, the seed lab will write a report on the results of those tests and provide that report to whoever submitted the seed sample.

A seed analysis report will include the following information: Pure Seed (%); Inert Matter (%); Germination (%); TZ Test, if performed; Weed Seed (%); Other Crop Seed (%); and Noxious Weed Seed (per lb). For a better understanding of this information, a breakdown of each category follows:

Pure Seed

Pure seed includes all seed of each kind and/or cultivar under consideration, which are present in excess of 5% of the whole. The submitted sample must be a representative sample from the seed lot being tested. The purpose of a purity analysis is:

- To determine the physical composition and quality of a seed lot; to verify the identity of the species in question; and to identify the other crop seed, weed seed, and inert material.
- To provide labeling information for state and federal seed act compliance.
- To identify and quantify any noxious weeds present to help prevent the spread of noxious weeds.
- To aid quality control decisions during harvesting and conditioning.
- To check for and prevent adulteration of seed lots through testing.
- To facilitate the standardization under which seed is sold. If AOSA (Association of Official Seed Analysts) rules are used by seed analysts, then tests can be duplicated more easily.
- To provide “pure seed” for the germination test. Specific AOSA rules are to be applied when determining the “pure seed” component. The method by which “pure seed” is determined can radically affect the germination test results.

The purity working sample is examined and separated into four purity component parts: Pure Seed, Other Crop Seed, Weed Seed, and Inert Matter. The purity analysis will be in percentages of each component over 5% of the whole. They must be listed, and preferably those under 5%, in descending order of predominance. The total of the four components must equal 100%.

Other Crop Seed

Seed of plants grown as crops are to be considered other crop seed, unless recognized as weed seed by laws, regulations, or by general usage.

Weed Seed

Seeds, florets, blublets, tubers, or sporocarps of plants recognized as weeds by laws, regulation or by general usage shall be considered weed seeds. *(In Michigan, if weed seeds exceed 1.00% in the sample, the seed lot is not allowed to be sold.)*

Inert Matter

Soil particles, stones, chaff, stems, leaves, flowers, cone scales, pieces of bark, pieces of resin, pieces of broken and damaged seed units of crops, which are half the original size or less, and damaged weed seed, with over half the embryo missing, all fall into the category of inert matter.

Noxious Weed Exam

Various state and federal laws regulate noxious weeds. They have been designated as such, because they are difficult to control by normal agricultural practices. The purpose of the exam is to identify and quantify any noxious weed seeds present. This helps prevent the spread of these weeds via the seed supply. There are typically two classifications of noxious weeds, **prohibited and restricted**. The presence of prohibited noxious weed seeds render a seed lot unfit for sale. Restricted noxious weeds require a seed lot to be labeled as to the rate of their occurrence but, if excessive, may render a seed lot unfit for sale.

Michigan prohibited and restricted weeds are listed in Appendix A.

Germination and Dormancy Test

Germination is the single most accepted index of seed quality. The procedures and regimes under which seeds are germinated has been, and continues to be, developed and evaluated by the AOSA as well as other officially recognized seed testing organizations. Percent germination is defined as the percentage of seeds that show normal seedling development when the germination test is complete. Percent dormancy is the percentage of seed that is viable but did not germinate during the germination test.

Tetrazolium (TZ) Test

A TZ test estimates seed viability by soaking non-germinated seed in a 2,3,5 triphenyl tetrazolium chloride solution. The solution will cause live seed tissues to turn red. The TZ test is used quite frequently by those producing, selling, and/or purchasing harvested seed. The TZ test is a fast and effective way to determine viability of a seed lot. The test can usually be completed in 1-3 days. The test cannot differentiate between dormant seed and seed that could readily germinate; therefore, a TZ test alone cannot measure dormancy. State laws differ on the label use of the TZ test results for viability labeling. The TZ test is not to be used as a substitute for germination test information intended for a label by most seed laws and regulations.

The AOSA rules refer to the use of the TZ test for determination of viability of ungerminated seeds at the end of a germination test. The test becomes a dormancy test when it is performed on the ungerminated seed remaining after a standard germination test.

An example seed laboratory sample analysis report is shown on page 4. In this example, the germination percentage, as determined by a standard germination test, is 29%. The dormant seed

(D.S.) percentage, as determined by a standard TZ test on non-germinated seed remaining after a standard germination test, is 48%. The total viability of the seed lot is determined by adding the germination percentage and percent of dormant seed. In this example, the total viability is: $29\% + 48\% = 77\%$.

Information from the seed analysis report is included on all seed package labels. Please refer to USDA-NRCS Michigan Agronomy Technical Note 13 “Using Seed Package Label Information to Calculate Pure Live Seed (PLS) and Seeding Rates” for additional information on seed package labels.

References:

- Association of Official Seed Certifying Agencies. 1999. Genetic and Crop Standards Manual, Association of Official Seed Certifying Agencies, Boise, ID.
- Front Range Seed Analysts [n.d] Seed Analysis Fact Sheets: <http://www.frsa.org/factsheets.html>; verified 16 Aug 2006.
- Michigan Department of Agriculture. 1990. Regulation No. 715 - Seed Law Implementation.
- Michigan Seed Law, Act 329 of 1965, as amended. MCL 286.701 – 286.716.
- USDA-NRCS Michigan, 2006 Purity Germination and Dormancy TZ (Tetrazolium testing) Agronomy Technical Note 13, “Using Seed Package Label Information to Calculate Pure Live Seed (PLS) and Seeding Rates,” Rose Lake Plant Materials Center, East Lansing, MI.

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EXAMPLE OF SERVICE SEED SAMPLE REPORT OF ANALYSIS



LABORATORY DIVISION
MICHIGAN DEPARTMENT OF AGRICULTURE
P.O. Box 30017
Lansing, Michigan 48909

SERVICE SEED SAMPLE REPORT OF ANALYSIS

(In accordance with Act 329, Public Acts 1965, as amended)

Laboratory No. 267150

Fee \$ 10.00

January 25, 2006

LOT NO. SFD-05-01

SAMPLE SUBMITTED AS Lancer Perennial Pea

SUBMITTED BY NRCS Rose Lake PMC,

ADDRESS 7472 Stoll Rd., East Lansing, MI 48823

RECEIVED 11/28/2005

DELIVERED BY Courier

PACKAGE Paper Envelope

Name of Seed - Perennial Pea

Pure Seed	99.54%	<u>Germination</u>
Inert	0.46%	29% + 48% D.S.
Weed	0.00%	
Crop	0.00%	
Noxious Weeds - Grams Examined - 500. None Detected		

Appendix A

Michigan Prohibited Noxious Weeds

- Bindweed, Field - *Convolvulus arvensis*
- Bindweed, Hedge - *Convolvulus sepium*
- Dodder - *Cuscuta species*
- Horsenettle - *Solanum carolinense*
- Johnsongrass - *Sorghum halapense*, including *sorghum almum* and seed which cannot be readily distinguished from Johnsongrass
- Knapweed, Russian - *Centaurea picris*
- Knapweed, Spotted - *Centaurea maculosa*
- Morning glory, *Ipomoea species*
- Nutsedge, Yellow - *Cyperus esculentus*, both seed and tubers
- Puncturevine - *Tribulus terrestris*
- Quackgrass - *Agropyron repens* = *Elytrigia repens*
- Sowthistle, Perennial - *Sonchus arvensis*
- Spurge, Leafy - *Euphorbia esula*
- Thistle, Bull - *Cirsium vulgare*
- Thistle, Canada - *Cirsium arvense*
- Thistle, Musk - *Carduus nutans*
- Thistle, Plumeless - *Carduus acanthoides*
- Tussock, Serrated - *Nasella trichotoma*
- Whitetop = hoary cress = perennial peppergrass - *Cardaria draba*

Michigan Restricted Noxious Weeds

- Alyssum, Hoary *Berteroa incana*
- Carrot, Wild - *Daucus carota*
- Charlock - *Sinapis arvensis*
- Cocklebur - *Xanthium strumarium*
- Dock, Curled - *Rumex crispus*
- Fanweed - *Thlaspi arvense*
- Foxtail, Giant - *Setaria faberii*
- Garlic, Wild - *Allium vineale*
- Jimsonweed - *Datura stramonium*
- Mustard, Black - *Brassica nigra*
- Mustard, Indian - *Brassica juncea*
- Nightshade complex, including all of the following *Solanum* species and any other species with indistinguishable seed: (i) Bitter nightshade, *Solanum dulcamara*, (ii) Black nightshade, *Solanum nigrum*, (iii) Eastern black nightshade, *Solanum ptycanthum*, (iv) Silverleaf nightshade = purple nightshade, *Solanum eleagnifolium*, and (v) Hairy nightshade, *Solanum sarrachoides*
- Oat, Wild - *Avena fatua*
- Onion, Wild - *Allium canadense*
- Plantain, Buckhorn - *Plantago lanceolata*
- Radish, Wild - *Raphanus raphanistrum*
- Rocket, Yellow - *Barbarea vulgaris*
- Velvetleaf - *Abutilon theophrasti*