



The North Dakota Seed Journal

SEPTEMBER 2013

Newsletter of the North Dakota State Seed Department

Inside

- 1 Germination vs TZ Testing
- 1 In Memory
- 2 From the Commissioner's Desk
- 2 2014 Approved Facility Applications
- 2 Research Fees Reminder
- 3 Variety Identification Testing Of Winter Wheat, Durum and Oats
- 3 Carryover Seed
- 3 Conditionally Passed Seed Fields
- 3 SDSU Eliminates Registered Class in Oats
- 4 Certified Seed Potato Growers Association Meeting
- 4 NDCISA Joins Farmers Yield Initiative
- 4 Farmers Yield Initiative
- 5 Research Fees – Two Decades Later
- 5 Certified Seed Promotions
- 6 Calendar

Germination vs TZ Testing

Jeanna Mueller, Seed Lab Manager

By the time this article is published, combines will be rolling in full force. There is always the anticipation in the fall to see what the end result will be in the field. For the producer, customer and seed control agents that end result is very important.

A customer recently called about a grass sample and asked “which is better a germination test or a tetrazolium test?” The question at hand needed a little bit of explanation.

In the *AOSA Rules for Testing Seeds*, germination is defined as “the emergence and development from the seed embryo of those essential structures that, for the kind of seed in question are indicative of the ability to produce a normal plant under favorable conditions”. The tetrazolium test is “a biochemical seed viability test using the compound triphenyl tetrazolium chloride (TTC)”.

In the TZ test, seeds are exposed to a solution containing TTC. The TTC is reduced to formazan in the presence of living (actively respiring) tissue. Formazan stains the living tissue red. At the end of the test, seeds are evaluated for the viability of their essential structures and examined for evidence of seed deterioration.

To answer simply which is better, would be a disservice to the nature of seed quality testing. In seed testing, many tests work hand in hand to produce an accurate result. When reading a germination test, we quantify normal and abnormal seedlings, dead and hard seeds. TZ testing quantifies seed viability. So, instead of answering the question, we need to find out what is right for the customer and their situation.

Listed below are four reasons for performing a tetrazolium test (taken from *AOSA Rules for Testing Seeds*):

- 1) To determine the viability of ungerminated seeds at the end of a standard germination test.
- 2) To determine the percentage of dormant seed when a separate standard germination test is required.
- 3) To estimate viability of a seed lot before completion of a germination test or to estimate viability independently of a germination test.
- 4) The tetrazolium test may also be used as a vigor test.

For the native forbs and grass samples we receive in the lab, we typically handle TZ tests for the first two reasons. If you plan ahead, the third reason should not be an issue.

Now is the time to send in native grasses and especially mixes. Our busiest time is January until planting. If you can, send your samples early. We are here to serve you, if you have questions give us a call. We hope you have a safe harvest season.

In Memory

Douglas G. Johansen

January 17, 1929 – August 17, 2013



Doug Johansen, retired Commissioner of the ND State Seed Department, passed away on August 17, 2013.

Mr. Johansen began his career with the department in 1971 as Director of Potato Programs, and served as Commissioner from 1988 until his retirement in July of 1999.

North Dakota State

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Seed Department

The North Dakota Seed Journal is published and edited by the Seed Department, State of North Dakota, under the provisions of Chap. 258, S.L. 1931, as administrative and instrumental matter required for effective transaction of the Department's business and for properly fostering the general welfare of the seed industry in the state.

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From the Commissioner's Desk

Glyphosate; Blessing or Curse?

I'm not here to argue the pros and cons of herbicide resistant crops or initiate some sort of GM vs. anti-GM discussion. This article is about the impact of glyphosate on seed production and quality.

Without question, glyphosate has changed production agriculture here and worldwide ... to many, a blessing to the industry. Glyphosate has "cleaned up" more ground in North Dakota than any tillage or chemical practice before or since its introduction over 30 years ago. Easier, cheaper, more efficient... all words associated with the Roundup-Ready™ or other generic glyphosate production systems.

Glyphosate is also used as a preharvest desiccant; accelerating ripening while providing late season weed control. This is the blessing and curse part of the discussion.

Glyphosate isn't labeled for use as a desiccant in crops intended for use as seed. Simply put, something about the herbicide impacts the ability of the non-tolerant seed crop to germinate properly. More simply put, the seed may germinate but usually generates abnormalities in plant structures. Type "glyphosate, seed germination" into any internet search engine and you find dozens of scientific articles related to the affect on germination of various crops. You will also find one authored by Steve Sebesta in June of 2011, discussing anecdotal evidence gathered in

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Jeanna Mueller..... Seed Laboratory Manager
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Mike Oosterwijk Potato Program Supervisor

our lab on the damage to germination in cereals and field pea. In many cases the grower has intentionally applied glyphosate at a low rate, late in the season, assuming there won't be damage to germination/vigor due to the crop's advanced physiological maturity.

To clarify, these cases usually involve commercial growers intending to save "seed" for the next year. This can be significant in North Dakota, where crop (and seed) production is very diverse.

It appears that vegetative crops have a different and more severe reaction to glyphosate in terms of seed germination/vigor. Small amounts of herbicide may translocate from leaf surface to the tuber resulting in severe emergence and/or shoot damage the following year. Worse yet, drift damage cannot always be seen on the growing crop (the previous year), and symptoms may not be seen on late season potato plants ... especially at the time when glyphosate is being used as a desiccant in other crops.

Over the past 2-3 years we have seen problems in potato seed production that may be the result of glyphosate spray drift. As the second largest seed producing state in the U.S., coupled with the high cost/value of seed potato production, this issue is of great concern to the North Dakota seed industry. Dr. Andy Robinson's article reprinted in this issue goes into greater detail.

Whether a blessing or a curse, glyphosate use in crop production is affecting the seed industry. As with any issue of field loss, especially those involving high cost crops, the potential liability and legal issues are the most profound for seed growers.

Best wishes for a safe and profitable harvest season.



2014 Approved Facility Applications

Kyle Bednar, Field Seed Inspector 1

2013 permits for operating approved seed facilities will expire December 31. The 2014 Approved Facility Applications were mailed to facility managers in early August. Please read, inform your seed staff of the contents and requirements of the agreement and return the signed application with payment by October 1, 2013. It would be helpful if you would copy your facility account number, found on your current permit, on to the application. Retain a copy for your records.

It should be noted that the contact information you put on the agreement will be published in the *Seed Directory* and on our website, so please make sure it is complete and accurate.

The *Seed Directory* will go to the printer in October so you must return your agreement by October 1 to be listed.

Facility inspections will begin in October. This would be a good time to check all your two pound samples for proper labeling. The lot, class, kind and variety are required to be listed on each different lot sold — a copy of a bulk certificate works well for this. Also check if all unused Bulk Certificates and Log sheets have been returned.

Please don't hesitate to call if you have any questions.

Reminder...

Research fees are due September 15. If you have not already done so, please remit payment promptly to the Seed Department for seed labeled in your name, sold through June 30, 2013. Do not pay your county crop improvement or ag association. The only way we can correctly reconcile your account is if the report form and check are sent directly to the Seed Department. Research fee reports must be returned even if no sales occurred. Thanks to those of you who have already paid your fees.

Variety Identification Testing Of Winter Wheat, Durum and Oats

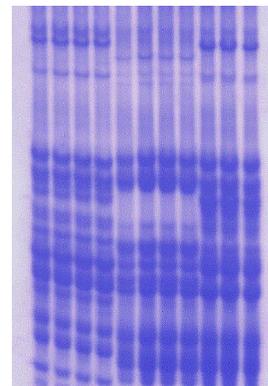
Jeff Prischmann, Diagnostic Lab Manager

The Diagnostic Lab at the North Dakota State Seed Department conducts variety identification testing as a requirement for certification on a number of crops including barley, field pea, and spring wheat. The lab also conducts variety ID testing for oats. Most oat varieties can be distinguished using this test. The test is very similar to that used by the lab for spring wheat and uses the technique of gel electrophoresis. Seed proteins from oat are extracted and visualized using gel electrophoresis. This test is able to differentiate a large portion of oat varieties from each other based on a specific seed protein banding pattern that is unique to that variety.

Since 1995, the Diagnostic Lab has conducted variety identification testing of wheat varieties using gel electrophoresis. This test does have some limitations. Wheat varieties developed from a narrow germplasm base can be difficult to distinguish. This includes many durum varieties and some varieties of spring or winter wheat originating from similar pedigrees. Traditional seed characteristics such as kernel shape or size may not always be adequate to distinguish wheat varieties.

With an increase in the acreage of winter wheat grown in North Dakota over the past few years, we have seen an increase in the number of samples and questions whether the lab can determine if a wheat sample is a variety of spring wheat or winter wheat. We can conduct testing in two different ways. The first method involves using a traditional seed protein gel electrophoresis test. This test can determine if a variety of wheat is the correct variety or a mixture. Initial tests on wheat are usually conducted on a bulk seed sample. However, testing individual seeds may be required for some samples. This would be required to quantify the percentage of admixture. However, this test does not verify the winter or spring growth habit of a variety, just that the sample is a match to a known variety. In this case, a second method can be employed. This test uses PCR (polymerase chain reaction)

Figure 1. **Variety Identification Test For Winter Wheat.** Protein gel electrophoresis test for winter wheat showing unique banding patterns found in various varieties of winter wheat.



▲ Figure 2. **Vernalization Gene Test For Winter Wheat.** Bands present in gel image above show wheat samples that contain the vernalization gene found in winter wheat. Samples with missing bands are spring wheat.

in combination with a specific marker for the vernalization gene in wheat. This test can specifically determine if a sample is winter or spring wheat.

Variety identification testing for durum wheat can be accomplished using a DNA test. A majority of the durum varieties can be distinguished from each other using this test which involves PCR and specific markers to distinguish varieties.

Customers interested in these tests should submit a 100 g sample and request a variety identification test. Any sample information the customer can provide the lab regarding the sample is important. This information helps narrow the possible varieties for the unknown sample and gives the lab a starting point. Information such as the suspected variety, type of wheat, etc. are all important. Please contact the department with any questions regarding variety identification testing of winter wheat, durum wheat, and oats in order to best determine the correct test for your particular situation.

Carryover Seed

When submitting samples of carryover certified seed for germination testing and new bulk certificates, several things are required. In order for us to process your sample we need a completed **Relabeling Request for Carryover Certified Seed** form including the required information. The form is on our website under Online Forms. Please include this form with your sample and include the number of bushels carried over, the certification number from the previous year and the number of bulk certificates you will need.

Conditionally Passed Seed Fields

Some seed fields may pass conditionally due to excessive weeds or other crops which may be difficult to separate during conditioning. Before conditioning, ask the grower if they have any of these fields. When these seed lots are conditioned, a five pound representative sample must be submitted for testing along with the **Seed Sampler's Report**. If a seed sample from a conditionally passed field is submitted without the required amount of seed, you will be notified to resubmit additional seed for testing which will delay the final certification process for the labeler. Conditioners are advised to always check Field Inspection Reports before conditioning a seed lot.

SDSU Eliminates Registered Class in Oats

Registered class seed of several South Dakota State University oat varieties will no longer be eligible for sale beginning with the 2013 crop. Only the Certified class will be eligible for sale. Seed growers who planted Foundation seed of Goliath, Horsepower, and Shelby 427 this year will be required to downgrade that seed to Certified class in order to sell those products. Growers are allowed to plant the non-saleable Registered seed to produce Certified seed. Sampler's Reports should be marked accordingly or the Seed Department will automatically downgrade the seed lot for labeling purposes.

Certified Seed Potato Growers Association Meeting

Willem Schrage, Potato Program Director

The summer meeting of the North Dakota Certified Seed Potato Growers Association was held in Grafton August 1. One of the topics discussed was damage to seed potatoes caused by glyphosate. I have included an article, reprinted with permission from Dr. Robinson, that appeared in the August 8 NDSU Crop and Pest Report.

Glyphosate on Seed Potatoes can Cause Major Problems

Andy Robinson, Potato Extension Agronomist, NDSU and U of M

Seed potato plants exposed to low levels of glyphosate can cause significant damage to the seed the following year. When seed potatoes uptake small quantities of glyphosate, it will translocate to the tubers and when seed potatoes are planted they may not emerge, they may have delayed emergence, or have malformed shoots when emerging. This will result in shoots being more susceptible to diseases, delayed canopy closure, and reduced yield and quality. Potato plants that have glyphosate residues in the seed had a 63% reduction in yield when they were delayed in emergence by approximately 3 weeks.

At this time of year, many acres of small grains receive a pre-harvest treatment of glyphosate. Potatoes are most susceptible to glyphosate at this time, and a small amount of glyphosate drifting into a seed potato field can cause thousands of dollars of damage. Seed potatoes are worth approximately \$4,000 an acre. One acre of seed potatoes will be planted back to 10 acres the next year, making the

value approximately \$40,000. Caution should be made when spraying fields with glyphosate next to seed potato fields. Communicate with your neighbors to let them know you will be spraying, Spray only when the wind is blowing away from the potatoes, and do not spray next to potatoes and leave a border.



Figure 1. Poor emergence of seed potatoes with glyphosate residues in the seed from the previous year.



Figure 2. Comparison of effect of glyphosate residues in potato seed on plant and harvested yield (on left) and normally growing potato plant and harvested yield (on right).

NDCISA Joins Farmers Yield Initiative

Joyanna Wardrip, NDSU Foundation Seedstocks

Since 1929, the North Dakota Crop Improvement and Seed Association (NDCISA) has helped North Dakota grow by supporting agriculture throughout the state. Essentially all of the funds that are collected by the NDCISA, a nonprofit organization, are returned to North Dakota agriculture through support of NDSU agriculture research and variety development, education, promotion, production of newly released varieties, and other activities related to agriculture.

That tradition continues, as the NDCISA board of directors voted at the summer meeting to become a sponsor of the Farmers Yield Initiative (FYI) to educate the public about intellectual property rights and seed law compliance and promote the use of certified seed.

Endorsing FYI allows the NDCISA to further its goals of educating growers, promoting variety ownership, and supporting agriculture research through research fees collected on legal seed sales. The NDCISA joins the ranks of many other well-known organizations, universities, and companies that have banded together to fund the mission of FYI, including the North Dakota State Seed Department, the NDSU Research Foundation, the National Association of Wheat Growers and other crop improvement associations from the major wheat producing states.

The NDCISA has a heritage of championing North Dakota agriculture, and sponsoring FYI fits in perfectly with the organization's mission and goals. The organization has a long history of support and donations to NDSU agriculture research and agriculture programs and this new partnership with FYI is a piece of the organization's continuing legacy. For nearly a century the NDCISA has supported agriculture in North Dakota and looks forward to doing the same for many more years to come.



The Farmers Yield Initiative, or FYI, promotes legal seed trade, research, education, seed certification, and the enforcement of intellectual property rights authorized under the Plant Variety Protection Act (PVPA) and patent laws. The purpose of the initiative is to educate the public and encourage compliance with existing state and federal seed laws embodied in the PVPA and state seed certification regulations. If you suspect illegal seed activity please consider submitting a strictly confidential tip to help put a stop to illegal seed trade. You need not identify yourself during the phone call. The caller can remain anonymous, and it is toll-free.

Phone completely confidential tips using the toll free number: **(877) 482-5907**

Email tips to: **tips@farmersyieldinitiative.com**

Mail tips to: Farmers Yield Initiative
PO Box 8850
Fayetteville, AR 72703

Research Fees – Two Decades Later

Steve Sebesta, Deputy Seed Commissioner

2013 is an anniversary of sorts for the Seed Department for a number of reasons. It is the 20th anniversary of the opening of the current Seed Department office on the west edge of campus that has served as our home since. Construction of the new facility, which includes greenhouse space for potato minituber production, and updated laboratory facilities actually designed for their purpose was completed in 1993. As part of the grand opening celebration, the Seed Department gave away the use of a brand new Ford F-150 pickup.

1993 was also the year that research fees came into existence in the northern plains states on a wide scale. I noted an article in the March 1993 *Seed Journal* by the late Bill Kuntz, seed certification specialist at the department, in which he communicated the intent of the University of Minnesota to assess research fees on varieties developed and released by the Minnesota Ag Experiment Station (MAES). Bill was less than enthused about the path the University of Minnesota chose regarding research fees on public varieties. The seed industry has changed tremendously since 1993.

While one may argue philosophically whether assessing research fees on public varieties is appropriate, one cannot argue that they have generated significant revenues for variety owners.

Under the original U of M plan, seed certifying agencies outside Minnesota returned 55% of the fees collected in their state to MAES and were allowed to retain 45% to be used at their discretion. The North Dakota State Seed Department decided to keep 10% of the fees collected to cover administrative costs of collection, then dedicated the remainder to benefit the seed industry in North Dakota. A couple years later the North Dakota State Seed Commission awarded a grant to the North Dakota Agricultural Experiment Station amounting to \$60,000 toward the purchase of a high capacity mobile seed cleaner. The ND Crop Improvement and Seed Association generously matched our gift.

While the NDSU Research Foundation collected research fees on soybean and potato varieties it licensed in the 1990s, it would be nearly a decade later before the NDSURF assessed research fees on agricultural varieties of other crops. In the fall of 2004 the NDSURF announced it was assessing research fees on all new releases of durum, spring wheat, barley, oats and flax. Seed Department management took a very active role in educating seed growers and labelers about the change to make the transition as smooth as possible. Since that time, millions of dollars of revenue has flowed back to the university. According to the NDSURF Fact Sheet, the "addition of research fees to the revenue stream is intended to enhance variety research and breeding effort currently funded to a large extent by commodity groups and state and federal funds."

Over the years the Seed Department has entered into agreements with NDSU, neighboring state crop improvement associations and private companies to collect research fees on their behalf for seed of their varieties sold in North Dakota. Part of the revenues the Seed Department has retained in

that time has been re-invested in other worthy projects to benefit agriculture in the state and region. The Seed Commission donated \$250,000 toward the construction of the new NDSU Greenhouse Complex, a state of the art facility in which scientists will work on the development of improved varieties that will benefit the region. In addition to variety development, other research conducted in the complex will benefit ND producers in other ways. The biosafety level 3 lab, for example, will permit scientists to work on potentially dangerous, non-native organisms in a strictly controlled and secure facility without the threat of a release into the environment. That research will be critical to our knowledge of controlling these organisms if and when they arrive in the state. There are only a few biosafety level 3 labs in the U.S. and most are federal facilities.

There is no question that research fees have contributed greatly to the revenues of the variety owners. It is my opinion that the record of the last 20 years demonstrates that the funds can be used wisely to advance crop research and stimulate the development of new varieties that will be beneficial to agriculture in North Dakota and the region. It will be interesting to see what transpires in the next 20 years.

NDSURF, Seed Department Enter into New Collection Agreement

The NDSU Research Foundation has extended the contract with the State Seed Department to collect research fees on behalf of the foundation for the sale of NDSU varieties in North Dakota. The new, three-year contract goes into effect January 1, 2014.



Certified Seed Promotions

As fall nears, the Seed Department is preparing for another season of promotional activities on behalf of the state's certified seed growers and retailers. We have budgeted more than \$70,000 for promotions for the next fiscal year.

Approximately \$30,000 (40%) has been budgeted for radio and TV advertising from November to mid-April. We'll also sponsor NDSU Bison football this fall and the state high school athletics championship playoffs throughout the year, as we have done in the past. These account for about 20% of our budget. We also promote North Dakota certified seed in prominent trade publications such as *Prairie Grains* and *Pulse News*. The remainder is spent on promotional products such as caps and the popular wall calendars and registration fees for the five major trade shows across the state.

Branding North Dakota certified seed is the primary objective of our promotions fund. We continually seek new opportunities to promote North Dakota certified seed so that your customers recognize the certified seed logo as the symbol of high quality seed.



North Dakota State Seed Department

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NDSSD Calendar

Sept. 10-12 .. Big Iron Farm Show, West Fargo

Sept. 15 Research fees due

Oct. 1 Carryover Seed Report due

Oct. 1 Applications due for approved seed conditioners and bulk retailers

Dec. 3-4..... NDAA Northern Ag Expo, Fargodome

Dec. 4..... SW District Crop Improvement Association, Dickinson

Dec. 5..... NW District Crop Improvement Association, Minot

Dec. 6..... NE District Crop Improvement Association, Lakota

Dec. 9..... SE District Crop Improvement Association, Casselton