



The North Dakota Seed Journal

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Newsletter of the North Dakota State Seed Department

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Field Pea Field Study Demonstrates Need for Quality Seed

Steve Sebesta, Deputy Commissioner

In years when seed samples are consistently and uniformly excellent, there is little opportunity to study occasional problems. The hot dry weather we experienced in 2012, however, gave us that opportunity to examine the effects of seed quality on field performance in field peas.

Customers occasionally challenge our germination test results when they get bad reports. It's understandable. On occasion we'll retest a seed lot when we see a problem or we'll even send a sample to another lab for an unbiased comparison and those test results have always been close – and certainly within the federal tolerance. And that tolerance is what is key to understanding test results like germinations. One must understand that each sample is different, thus each test result is different.

In germination testing, multiple reps of a sample are planted and put into the germination chamber. After the prescribed length of time, the analyst reads each rep and determines the number of normal, abnormal, hard and dead seeds. The average of each is what is reported. In 2012 field peas, germination scores ranged from 98 to 23. Poorer samples had high numbers of abnormal seed. This range is what provided us with adequate samples to study this year.

Since some growers have expressed that they achieve greater stands in the field than the germ test result would predict, we initiated a field study with the cooperation of Blaine Schatz at the Carrington Research and Extension Center. The objective of the study was to determine field emergence and performance of field pea seed lots with different germination (and abnormal seed) scores. From 365 samples, 19 varieties were identified with the widest range of germ results. That list was narrowed to eight varieties with germs ranging from 23 to 95%. There were 24 total entries and each entry was replicated four times. Each plot was bordered on either side by a common variety to remove any error due to competition between plots.

Seeding rates were adjusted to 225,000 plants per acre and the plot was seeded May 28. Expected plant populations were calculated based on reported germs and seeding rate. Stand counts were taken on two separate dates, approximately one week apart to account for any late emerging seedlings. Additional data, including plot yield were collected, but that information will be reported later. What I want to focus on now is the emergence data.

Preliminary review of field emergence data indicated good correlation between the germination test score and field emergence. Figures 1 and 2 show the



Figure 1. 27% germ, 33% stand



Figure 2. 94% germ, 87% stand

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From the Commissioner's Desk

Like most people, I can usually find something that's a little worrisome in my day. It may be anxiety over work issues, the Department, problems in the industry, stupidity in D.C., family. Not necessarily in that order, but you get the idea. I prefer to think of this as a natural problem-solving instinct rather than worrying.

Nearing the end of a production year, there are often a few trouble spots or anxious moments. This time of year, I'm often asked the question "What does the seed supply situation look like going into next year?" A secondary question may involve seed quality, but it's usually some variation of a similar theme. Like most of us, I instinctively look for potential problem spots.

Tough questions. The answers depend on a lot of things and, if you operate in a world of environmental variables as extreme as we do, there are no easy answers and plenty of anxiety. The general answer this year appears to be...pretty good. It certainly looks like the seed industry has again overcome weather-related challenges to produce a solid crop in yield and quality terms.

The foundational issue to the supply question is always acres in production. Like 2011, this year's acres in the certification program are down...substantially. Coupled with extremely late plantings, the outlook for potential supply problems was certainly negative in the early going.

Whether through the divine intervention of Mother Nature or the ability of producers to overcome production, economic or environmental challenges, it seems there is seldom a reason for

Ken Bertsch..... State Seed Commissioner
Willem Schrage Director, Potato Program
Joe Magnusson Field Seed Program Manager
Jeanna Mueller..... Seed Laboratory Manager
Jeff Prischmann.. Diagnostic Laboratory Manager
Kris Steussy Administrative Officer
Mike Oosterwijk Potato Program Supervisor

concern. Somehow, you managed a near-record cereal crop and surprising soybean/oilseed/pulse crop yields. Of course, three weeks of cool weather in July and August on the heels of late planting doesn't hurt. In the end, regardless of acreage reductions, it appears that supply shouldn't be a problem. Ditto for seed quality.

After years of watching and worrying about environmental conditions affecting seed production of the main field crops in certification, and seeing the ability of the seed industry to overcome whatever problem is thrown its way, what I've learned is this: quit worrying.

Somehow, some way...things seem to work out. And, a little good luck doesn't hurt. Relax. Chill out. Hang loose. Hakuna matata.

My writing checklist now contains a reference to a Lion King phrase in print. Finally! Here's to hoping your checklist now contains a safe harvest, full bins, winterized machinery, a trophy buck hanging and the Bison in the hunt for another national championship.

Best wishes for happy holidays, and a safe and profitable new year.



NDSU Research Foundation Sues Over Unauthorized Sales of Oat Variety

The NDSU Research Foundation (NDSURF) recently filed a lawsuit against Brookings, South Dakota seed retailer, Sexauer Discount Farm Services and Jeff Muckey, for allegedly selling a Plant Variety Protected (PVP) variety without paying royalties. Farmer's Yield Initiative (FYI) filed the lawsuit on behalf of NDSURF.

The lawsuit accuses Muckey and Sexauer of buying 'Souris' oat and reselling it for planting, without authorization from NDSURF. The lawsuit says Sexauer regularly bypassed the Plant Variety Protection Act, which grants royalty rights for seed sales to the developer, in this case NDSU.

"Sexauer would maintain an inventory of the PVPA-protected seed to have ready for sale to unauthorized buyers and would pay no royalty to the Plaintiff for any sales," the lawsuit says.

"NDSURF returns a portion of licensing revenue to the university's research labs, ultimately benefitting farmers and taxpayers by developing new varieties" according to Dale Zetocha, executive director of the research foundation.

"The 'Souris' oat variety is licensed exclusively in the United States to Dakota Select Seed, part of the North Dakota Crop Improvement and Seed Association. A sublicense from Dakota Select Seed is required for anyone wanting to sell seed of the 'Souris' variety" said Zetocha. "Sexauer did not have a sublicense from Dakota Select Seed."

"Farmers Yield Initiative members such as NDSURF would rather reach and did attempt to reach a settlement that stops the sale of protected seed than file a lawsuit," the group's attorney Mark Henry says, "but not all sellers are receptive to that."



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

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differences in emergence for two entries on July 2, approximately one month post-planting.

In 12 of the 24 entries, the final stand was greater than what the germination score would predict. The mean increase was 7 points for those entries. However, the mean lab germination score of those 12 entries was 47% and the greatest difference between final stand and lab germ was in those entries with the lowest germ. This makes perfect sense; as germination scores decline we normally observe greater variability in the individual reps.

In 8 of the 24 entries, the final stand was less than the germination score. The mean decrease was 4 points for those entries. The mean germination score for those entries was 88%. Again, this makes sense; seed lots with high germination scores are usually consistently good across reps.

Four entries exhibited no difference between the germination score and the final stand.

So, in general terms this study demonstrated:

- Seed lots with low germination scores tend to have lower stands in the field. There may be a slight increase in final stand compared to the germ test score (occurring 50% of the time in our study), but the increase is only slight. There were 9 seed lots with lab test scores equal to or less than 50%. The mean germination score of this group was 39%. The mean plant stand of this group in relation to germination was 44%.
- Seed lots with high germination scores tend to have higher stands in the field. There were 5 seed lots with lab test scores equal to or greater than 94%. The mean germination of this group was 95% and the mean plant stand of this group in relation to germination was 94%.

Poor seed quality will result in poor stands which will contribute to production problems including:

- Poor emergence and stand establishment
- Non uniform plant development leading to harvest problems and seed moisture variations
- More weeds leading to harvest difficulties and increased dockage
- Maturity differences leading to delayed harvest and increased seed moisture
- Poor yield from competition for resources
- More variability in seed size, difficulty sizing seed or grading issues

The reasons for seed quality testing should be obvious. If you produce and sell certified seed, regardless of crop, you should be using these to your advantage in marketing your product. If you purchase seed you should pay attention to the quality.

Field pea germination/emergence study for the cultivar 'Agassiz'

Seed Lab Germ (%)	Expected Plant Population	Plant Stand First Count	Plant Stand Final Count	Final Emergence (%)
94	211,500	211,160	195,224	87
83	186,750	174,164	179,856	80
74	166,500	152,536	154,813	69
59	132,750	129,200	132,615	59
49	110,250	114,971	126,355	56
42	94,500	114,592	110,797	49
35	78,750	95,620	102,450	46
27	60,750	60,331	73,422	33

Seeding rate adjusted to 225,000 PLS

Completing Final Certification

Galen Briese,
Field Seed Specialist

Now that harvest is over and it's time to condition your certified seed, don't ignore the Field Inspection Report.

Note any problems the inspector may have identified in the field and follow instructions that are on the report. A copy of the inspection report should be provided to the conditioner when the seed is conditioned for final certification. In some cases a seed field may have passed conditionally. If so, a five pound sample is required for purity testing. If a five pound sample is not submitted you will be contacted for a larger sample and that will obviously slow down final certification.

Be certain bins are clean before putting certified seed into them, whether unconditioned or conditioned. Make sure bins are labeled to prevent accidental comingling. Periodically check your bins to make sure the seed is storing well. If you submit a sample of unconditioned seed for a pre-germ, we strongly recommend retesting the germ on the conditioned sample submitted for final certification. Seed can go bad under poor storage conditions and a \$15 germ test can save you a lot of problems. Remember, pre-germination results can't be used for final certification with fragile seed such as chickpeas, field beans, field peas, lentils and soybeans.

The process of final certification is the last step in producing certified seed. Seed may not be advertised or sold as certified seed until final certification has been completed and the seed lot has been labeled.

Remember, good quality seed is what establishes your reputation as a seed producer and retailer.

Inspectors Wrap Up a Successful Year

Kyle Bednar, Field Seed Inspector I

Facility inspections began in late fall and is almost wrapped up for the 2014 season. I would like to thank my fellow dedicated inspectors – Ordean Jacobson, Tiffany Smith and Nile Yoder for another successful year. We would like to thank the facility owners and their employees for the support shown to our staff when we are on site to conduct the inspection.

The inspection process is a valuable practice for both the Seed Department and the facility owners. Numerous areas are evaluated for compliance with the North Dakota seed laws and state and federal certification regulations. The results of our inspections indicate that the facilities were keeping up with the requirements that they are responsible for in order to maintain varietal identity and product quality and reduce the liability for their facility. Here are a few things to keep in mind to ensure a successful inspection next fall:

- Remember to label all bins and keep an up-to-date bin chart.
- Maintain a representative two-pound sample of each seed lot.
- Be sure that all seed equipment is thoroughly cleaned before certified seed is handled.

I encourage you to contact the State Seed Department office or your inspector if you have any questions.



Laboratory Testing for Seed Potatoes

Willem Schrage, Potato Program Director

The evaluation of North Dakota seed potatoes in the winter test still depends mostly on visual symptoms of virus expression. Changes in symptom expression of PVY have occurred, which are dependent on virus strain and variety. North Dakota will test leaves from the winter test for PVY with ELISA and includes potential symptomless varieties such as Russet Norkotah, Silverton, Shepody and Alpine Russet. On request from the ND Certified Seed Potato Growers Association leaves from N and G1 will also be tested.

Other states and provinces have different laboratory testing requirements for seed to be planted there.

For re-certification in Idaho, leaves from the winter test must be tested for PVA and PVY. Please let the Grafton office know if you expect to send seed to Idaho. Visual readings for PLRV are still accepted in Idaho.

Colorado has a quarantine for late blight, therefore, tubers must be found free from late blight in an incubation test. Please plan ahead to have tubers incubated, since this takes time and may delay a shipment. Colorado also wants negative test results for strains of PVYn.

Montana also has a quarantine for late blight, which for Montana means that no late blight may have been found in either field or tuber inspection. Such a statement needs to be on the federal shipping point inspection certificate (FV 184).

Canada requires a laboratory test for bacterial ring rot and a negative result. Also there needs to be a declaration that there was a negative potato cyst nematode soil test. The province of New Brunswick demands that all seed to be planted in that province has undergone laboratory testing for PVY.

Leaf testing during the winter test can be replaced by a sprout test, which is more expensive, because we need five times as many wells for the ELISA test.

Soybean Genetic Trait Testing

Jeff Prischmann, Diagnostic Lab Manager

The development of herbicide tolerant soybeans has resulted in a need by growers of conventional or non-herbicide tolerant soybeans to verify that their seed or commodity does not contain these traits. There are several tests available to confirm that seed is free of these genetic traits.

The North Dakota State Seed Department Diagnostic Lab conducts several genetic trait tests for soybean including flow strip tests, ELISA tests, and PCR tests. Flow strip tests are quick and accurate and give a qualitative, yes or no answer to whether or not a sample contains one of these traits. Flow strips are antibody based tests and test specifically for the proteins that are produced by herbicide traits such as the proteins produced by Liberty and Roundup tolerant soybeans. Our lab typically conducts this test in triplicate meaning that a sample of 300 or 400 seed is tested 3 times. The additional reps provide a more accurate test result and raise the level of confidence the customer has in the test. It also can provide a semi quantitative result, meaning that the amount of the trait in the sample can be closely determined within a range. Our lab typically conducts this test using a flow strip that can detect both the proteins produced by Liberty and Roundup tolerant soybeans. This test can be performed relatively quickly.

ELISA tests are also antibody based tests that detect the protein of an herbicide tolerant soybean. This test requires the use of specialized lab equipment, including a plate reader, and takes longer to complete in comparison to a flow strip test. This is a quantifiable test and detects an exact, low level percentage of the Roundup trait in a soybean sample. Typically, a sample of 1,000 seed is tested and a level of 1 positive seed in 1,000 seed can be detected with this test.

The third test that the lab conducts for genetic trait testing in soybean is a PCR test. This test detects the specific DNA that genetic traits contain and is able to detect 1 positive seed in a 2,000 seed sample. Also, this test specifically detects the Roundup gene as well as the 35S promoter and the NOS termination sequence. The presence of Liberty traits can also be detected. PCR is qualitative, meaning that the test results are positive or negative. This test can also be performed in a semi-quantifiable manner similar to a flow strip test and requires 2-3 days to complete.

Current prices on these tests are \$60 for a flow strip test, \$100 for an ELISA test, and \$180 for a PCR test per sample. Please contact the department with any questions regarding genetic trait testing of soybean.

Who Moved My Cheese?

Steve Sebesta,
Deputy Commissioner

Some of you might recognize the title as that of a book about change, and how one chooses to deal with it.

After ten years at the Seed Department, I have decided to make a career change. A few weeks ago I accepted an offer to join Monsanto's wheat program as northern region manager for WestBred. There are many exciting things ahead in the wheat industry and I am excited about the opportunity to work with the crop I started my professional career in more than 30 years ago.

Change is not always easy. I sincerely appreciate the opportunities and freedoms Seed Commissioner Ken Bertsch has given me over the years and I have great respect for the people at the Seed Department. They are real professionals who work hard and always have the customer's best interest in mind and I know that won't change. We have accomplished a lot in the last ten years and I can honestly say that I loved my job and always looked forward to going to work every day.

The seed industry in North Dakota is strong and will remain so because of your commitment to producing quality products for your customers. I appreciate the many friends I have made over the years and I look forward to continue serving the region's producers, albeit in a different capacity.

I am reminded of a quote from my favorite philosopher, Will Rogers, who once said "You've got to go out on a limb sometimes because that's where the fruit is". Or maybe the cheese.

Causes of Abnormal Seedlings

Jeanna Mueller, Seed Lab Manager

We received many soybean and field peas with internal damage and splits last year. So far this year we have not seen many problems in soybeans, but we are getting a few field peas sporadically with damage. Many situations can cause an abnormal seedling.

According to AOSA Seedling Evaluation Handbook Volume 4, "seedlings are classified as normal if they have no defects or only slight defects that will not impair the continued development of the seedling or plant when grown in soil under favorable conditions. Seedlings are classified as abnormal if they have defects that will prevent them from developing into mature plants when grown in soil under favorable conditions." These defects can be missing epicotyls (shoot), hypocotyls (area between epicotyls and roots) or roots. They can also include shortened roots, and deep cracks extending into the conductive tissue to name a few.

The AOSA Seedling Evaluation Handbook Volume 4 lists the following for causes of abnormal seedlings:

Mineral deficiencies - Crops grown on soils with mineral deficiencies may produce seeds that produce abnormal seedlings when germinated. The abnormalities are usually characterized by shrunken, hollow, brown or pithy areas on the cotyledons.

Frost Damage - Freezing temperatures when the seeds on the plants are in the developmental stage can cause damage to the seed.

Heating - Over-heating can occur if seed is too moist when the crop is harvested and it is not given an opportunity to dry before further storage. Heated seed also shows a high percentage of dead or moldy seeds, or seedlings that decay after sprouting.

Mechanical Damage - Mechanical breakage of seeds may occur during harvesting, threshing, loading, hauling, unloading, and cleaning operations. Large-seeded legumes such as field bean, soybeans and peas are especially susceptible to threshing or combine damage. It was evident last year this was the main cause of abnormal seedlings in our legume samples.

Insect Damage - Seeds that have become infested with insects may produce seedlings that lack essential seedling structures or are weak and stunted. In some cases the adult insect lays an egg in the developing ovule and the damage is caused by the larvae eating away the tissues inside the seed coat. Rarely do we see insect damage in seed samples; if we do it would be in alfalfa or other clovers.

Chemical Damage - Some fungicides or insecticides, used for seed treatment, can cause abnormal seedlings in germination if excess amounts of the chemicals are used. We consistently see what appears to be chemical damage. The roots are commonly more shortened or stunted with missing root hairs and have the appearance of a spider. It is very important not to use pre-harvest chemicals on any field that is intended for seed production, they are not labeled for use on seed fields.

Declining vigor - Seeds that are aged, or have been stored in unfavorable conditions are usually slow to germinate. Every year we get carryover seed for germ testing. It is important for growers to test any carryover seed they may have.

Pathogenic infections - Although seed infected with pathogenic organisms may initiate growth, one or more of the essential seedling structures may be damaged or destroyed by fungi or bacteria. When the seedlings of a test are badly infected with pathogenic organisms, the germination analyst must be careful in differentiating between primary and secondary infections. In evaluation, if we see a small grain sample with scab we will plant the seed in 50 seed reps instead of 100 seed reps to prevent the scab from affecting adjacent healthy seed.

Most of these problems are preventable. Most commonly we see mechanical and chemical damage. If you think that you may have an issue, send it in to us for testing. A germination test is much cheaper than a gamble. Send in your samples earlier rather than later, January through planting is our busy time. We are here to help, give us a call with any questions or concerns. May you have a happy holiday season.

North Dakota State Seed Department

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NDSSD Calendar

- Dec. 31**..... Application deadline for Non-Resident Seed Dealer License
- Jan. 7-8**..... Lake Region Extension Roundup, Devils Lake
- Jan. 19-21**.... ND Grain Dealers Association Annual Meeting, Fargo Holiday Inn
- Jan. 27-28**.... Northern Pulse Growers 20th Annual Convention, Holiday Inn, Minot
- Jan. 29-31**.... KMOT Ag Expo, Minot
- Feb. 6** ND Crop Improvement and Seed Association Annual Meeting, Grand International Inn, Minot