

New Ash Research Project

Russell Mathison, Agronomist

Research was begun in July 1996 at the North Central Experiment Station to investigate the agronomic benefits and environmental impacts of applying ashes from Potlatch Paper in Cloquet, MN to agricultural cropping systems. The ashes are the result of burning waste wood and mill stream sludge to produce electricity.

Specifically, because the ash is high in calcium content and pH, it is being evaluated as a liming source to neutralize acid soils for the production of pH sensitive crops, such as alfalfa. These ashes also contain significant amounts of

several elements needed for plant growth, so the material is being evaluated as a crop fertilizer as well. The use of this industrially produced ash has the potential to substantially enhance farm profitability and sustainability by lowering or eliminating the need to purchase agricultural limestone and commercial fertilizer.

Research of this type has been done before on ash and other industrial by-products. Ashes from several sources have been shown to be very effective lime substitutes and acceptable sources of plant nutrients, with no detrimental environmental effects associated with their use. So, are we trying to reinvent the wheel here? Why was this research begun, if we likely already know the end results? There are



Ash was applied to 10 x 20 foot plots and later seeded to alfalfa

several reasons. Potlatch, who is voluntarily initiating and sponsoring this research, is demonstrating corporate responsibility and good-faith accountability by doing as much as they can to ensure there are no environmental hazards in applying ash to agricultural lands. Potlatch also wants data on benefits to alfalfa production specific to their ash to help them build a successful land-application program with alfalfa producers. The Minnesota Pollution Control Agency (MPCA) has begun regulating the land-application of industrial by-products, including ash. Ash producers with acceptable land-application programs in place when regulation began were "grandfathered in," however ash producers desiring to start a land-application pro-

gram are required to provide much detailed information to receive MPCA permission to land-apply their materials.

Data collection on this research project is scheduled to proceed for three years, through the summer of 1999. The data will likely substantiate that ash from Potlatch in Cloquet is an excellent lime and fertilizer source, similar to results found on ash from other sources. Agricultural producers with a particular interest in this project can stay informed by contacting the Carlton County Extension Office, PO Box 307, Carlton MN 55718-0307.

*Wishing you all a
Happy Holiday Season*

from

*the North Central
Experiment Station Staff*

This archival publication may not reflect current scientific knowledge or recommendations.
Current information available from University of Minnesota Extension: <http://www.extension.umn.edu>.

Scab in Wild Rice

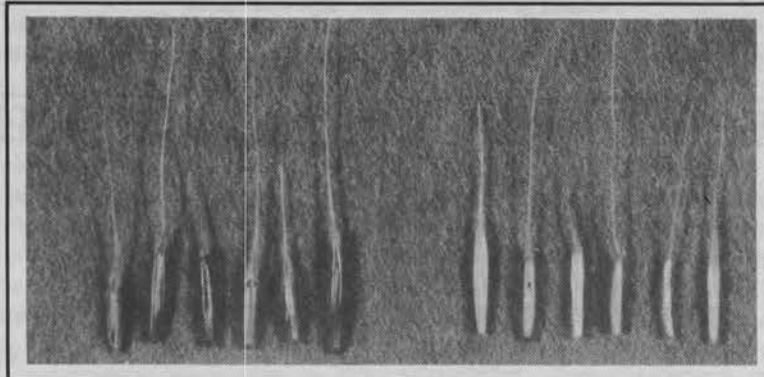
Robert Nyvall, Professor/Plant Pathologist

Scab is a common disease of small grains that is caused by a group of fungi that are commonly found in our environment. Prior to 1993, this disease was unknown on either wild rice (*Zizania palustris*) or white rice (*Oryza sativa*). The unusually high incidence of scab on wheat in northern

Minnesota in 1993 may have accentuated the incidence of scab on wild rice. However, conditions of high humidity that favor the development of scab on small grains are commonly found in wild rice stands regardless if they are located in a river, lake or cultivated paddy. Disease observation notes and anecdotal evidence suggest the presence of scab symptoms on wild rice from previous years. Therefore, it is likely that scab has been a common disease of wild rice in the past regardless of where the plants were grown.

The danger of scab is two-fold. One is a reduction in yields. The second is the production of toxins that may be harmful to people when ingested with contaminated food. Research was undertaken in 1994 and 1995 to determine the incidence and severity of scab on wild rice. General symptoms of scabby grain is the presence of bleached seed or seed that is discolored pink due to growth of the causal fungi, *Fusarium spp.*

Because scab symptoms on wild rice have not been readily noticed, seed samples were examined for whole seeds that displayed typical scab symptoms common on other



Healthy wild rice seed (l); scab on wild rice seed (r)

small grains, such as wheat. Light brown, bleached or otherwise discolored and shrunken seed was examined and isolations made. Typical symptoms are a white to light brown color; however, infected seeds do not appear to be shrunken. Some seeds have a light pink discoloration that is apparently due to mycelial growth of *Fusaria*. *Fusarium spp.* were isolated from 100 percent of seeds that displayed scab symptoms and from 1-26 percent of seeds that did not display symptoms. See figure.

Wild rice seed was gathered from paddies or from natural lake or river stands. My results indicate that *Fusarium spp.* were consistently isolated from all seed sources regardless of their origin. Additionally, there was no difference in incidence of *Fusaria* isolated from wild rice seed dried to 20-21 percent moisture content and stored at either -20 or 4° C; however, *Fusarium spp.* were not isolated from seed immediately stored in water after harvest. Instead other harmless fungi were consistently isolated from all seed samples stored in water.

Fusarium spp. were consistently isolated from all seed structures

and were present in the caryopsis regardless of seed source or temperature of storage. Generally, if there is a high incidence of *Fusaria* isolated from whole seed, *Fusaria* will be isolated from the palea and lemma, and caryopsis also.

Fusarium graminearum was the predominant species isolated from whole seed, palea and lemma, and caryopsis of wild rice seed. Other *Fusarium spp.* that were present were *F. anthophilum*, *F. culmorum*, *F. moniliforme*, *F. sporotrichioides* and *F. subglutinans*. However, these species were infrequently isolated. *Fusarium anthophilum*, *F. culmorum*, *F. sporotrichioides* and *F. subglutinans* were isolated only from seed gathered from paddies and were not isolated from lake wild rice sources.

Most seed appears to be infected early in its development in the milk stage. Most of this seed shatters and falls to the soil surface thereby reducing yield. My research indicates that in some fields over 60 percent of seed that shattered was diseased by scab. Less than 2 percent of harvested seed was diseased and the causal fungi were not isolated from processed seed. This is thought to be due to high temperatures destroying the causal fungi during the parching process.

There is no difference between rice raised either in paddies or from natural stands in the incidence of scab. Therefore, natural stands of wild rice are as likely to become diseased as cultivated stands.

Alumni News

Tom Carpenter

Sorry there hasn't been much alumni news recently, but no-one has sent me information or news to share with our readers.



Don Daley (l) and Joe Rust (r), former superintendents of NCES, enjoy a visit at the employee/alumni picnic.

Getting ready for the centennial celebration this summer kept the station busy. The turn-out was great and a thank you goes to the NCSA Alumni as we carried 85 percent of the attendance. We were represented well at the banquet also, with presentations being made by Don Daley, Dick Anderson and myself. Thanks to everyone that attended!

Our next get together will be July 19, 1997 for our All Class Reunion. Mark that date on your calendar. The committee will be working hard to put together a busy day of entertainment. The banquet will be upstairs at the Sawmill Inn which is a nicer and larger room than what we had before. Any suggestions on what you would like included would be welcome, but

not on the 19th of July!

Dick Anderson has stopped out a few times this year to visit -- maybe we can get him to tell a story or two of his school years as a teacher and dorm life with his family at our reunion.

We have gained a few alumni that have missed mailings in the past. Please make sure that alumni you know are on our current mailing list. In 1994 our registration showed 148.

Archie L. Johnson, dairy herdsman at NCES from 1951-1978 passed away October 2 at the Itasca Medical Center. Funeral services were held Saturday, October 5 at the First Evangelical Lutheran Church in Grand Rapids. Our sympathy to his wife Elaine and family.

North Central Dedicates Natural Area

As part of our centennial celebration NCES dedicated a 15-acre area of upland and lowland forest types as a Natural Area. The Natural Area is divided into six acres of upland, old-growth type red and white pine and nine acres of black spruce lowland or bog.

The upland old growth type forest area has many of the characteristics of a typical Minnesota older forest type. The largest trees are 150-175+ years old red and white pine. Natural succession has produced a more mixed species/understory type dominated by balsam fir within the mixed red and white pine stand.

The lowland or bog contains a forest dominated by black spruce, a typical swamp or bog conifer.

Within the bog are a variety of herbaceous bog-type plants including lady slippers and pitcher plants. Numerous woody swamp-type shrubs such as leatherleaf and labrador tea can be found in the bog. A "board walk" extends into the bog area and passes by many bog plant types.

The experiment station is committed to maintaining the area in its natural state. Disturbances will be limited to removal of fallen trees on trails, roadways and paths, mowing or grooming the existing ski or walking trails and placement of necessary signage to enhance the educational value of the area.

A steering committee has been formed to assist with the development of plans to improve the value

of the Natural Area as an educational site for students and the community. This winter, curriculum and lesson plans relating to understanding bog-type hydrology and the role of bogs and other wetlands in our ecosystem will be developed for various age groups of students.

A comparison can be made between the black spruce bog and a separate 15-acre sedge/cattail type wetland also located on the station. These two wetland classrooms are an example of a continuing effort by many units of the University to help better understand our relationship with the environment in which we live.

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News from North Central



David Rabas, Station Head

25 Years of Service

Dr. James Boedicker was recently recognized for 25 years of service to our experiment station. Dr. Boedicker joined the NCES staff as Agricultural Engineer in 1971. He received his Ph.D. in Agricultural Engineering from North Carolina State University in 1972. His research interests are power and machinery, structures and environment.



Dave Rabas, Station Head (r) presents a plaque for 25 years of service to NCES to Jim Boedicker, Agricultural Engineer (l)

The October 29 snowfall served as a reminder that winter was not far away. At NCES we are in the process of collecting final field research data and attempting to finish fall field work before freeze-up. In spite of a late spring and a very cool April most crops, with the exception of late planted silage corn, did very well this season. Rainfall was adequate to maintain pasture and forage growth and extra heat units in August and September helped mature some of our full season crops. A hailstorm in late September damaged a greenhouse and some of our late season vegetable crops.

Our Centennial Celebration in July was the highlight of our year. It was great to see the many alumni of the School of Agriculture and the many other friends of North Central return to our station. The camaraderie, the stories and the tremendous expression of support for our station made all of us proud. Thanks to all who came or wrote or helped make our celebration a success. Thanks also to the many friends of North Central for their generous contributions to our Centennial Campaign Fund. Your dollars will be used to maintain and expand our efforts to find answers to questions and to provide information which is useful to the people of our state and area.

This summer we welcomed three new staff members. Laura Wagner joined our staff in March as a Junior Laboratory Technician in Dr. Nyvall's plant pathology lab and Keith Mann began a new position as an Assistant Farm Animal Attendant in June. Chad Statsman filled Mann's half-time Senior Laborer position in August. Welcome to Laura, Keith and Chad.

Thanks to Dan Erkkila and Jim Boedicker, our administration building was wired and the hardware and software put in place for us to network our computers and establish direct high speed contact with the internet. Technology advances in information transfer and data gathering, management and analysis have allowed our scientists to more efficiently and accurately collect, share and utilize research data. Bar code readers, data mite recorders, electronic instruments and advanced computer technologies are just a few examples of the way researchers are using technology to discover and share information needed to solve problems for our customers.

As we look forward to the Twenty-First Century we look forward to the changing role of our branch experiment stations in the information gathering and distribution system within the University. Discussions have been ongoing within the Agricultural Experiment Station to rename the branch stations as Research and Education Centers. This new name recognizes the changing role of the stations in the teaching, research and outreach mission of the University. Distance learning/teaching opportunities and an expanded role in the outreach mission are just two of the potential new or growing roles for the branch stations.

As the holiday season approaches I would like to take this opportunity on behalf of all the staff at NCES to wish all of you a safe, happy and rewarding holiday season.

Upcoming Events

Feb. 12, 1997 Beef Cow/Calf Day

July 19, 1997 All Class Reunion

The North Central Quarterly
Issued by

The UNIVERSITY OF MINNESOTA
North Central Experiment Station
1861 East Hwy 169
Grand Rapids MN 55744-3396
218-327-4490

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Published February, April, July, November
ISSN 0199-6347

by the North Central Experiment Station
Grand Rapids MN 55744

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Periodicals postage paid at Grand Rapids, Minnesota

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