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# The North Central Quarterly

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Published by the North Central Experiment Station

GRAND RAPIDS, MINNESOTA      APRIL 1997      VOLUME 67 NUMBER 2

## Local High School Science Teacher Works With Wild Rice

Raymie Porter, Wild Rice Breeder

During the summers of both 1995 and 1996, the Wild Rice Breeding project obtained the expertise of a local high school chemistry and physics teacher, Robert Shaner. This program was sponsored by the University's College of Agriculture, Food, and Environmental Science and administered by the Minnesota Department of Agriculture's Al Withers as part of the "Ag in the Classroom" program. Mr. Shaner applied for the three-week Assistant Scientist position at NCES, and was placed with my project in 1995, based on our mutual interests. His hope, and the goal of the program, was that he would gain a better appreciation of agricultural research, which he could then take back to the classroom. His students would benefit by a new awareness of the many possibilities of agricultural research as a career, or at least a new appreciation for the science of agriculture which they could take with them into society at large. In the process, we would benefit from the fruit of his work with us, and from the contact with the school.



Bob Shaner, science teacher at Grand Rapids High School, measures the force needed to pull wild rice seeds off the plant.

After probing several possibilities, we settled on a specific research project and protocol. The work would be aimed toward getting a better understanding of the changes over time in seed tensile strength, or the strength with which seeds are held onto the plant. Former wild rice breeders and I have used tensile strength

for some years as a way of quantifying the potential for seed shattering (the falling off of seeds prior to harvest), but I had questions about how and when to best take these measurements in order to obtain the most accurate comparison between varieties or breeding lines for tensile strength.

Mr. Shaner set about the task of learning about the wild rice breeding research effort and obtaining enough data to answer the question. Over the course of several weeks in 1995, he measured over 7,000 seeds individually, and obtained baseline data to compare 25 varieties. Based on that data, we were able to zero

in on how many seeds per panicle (seed head) we need to measure, heads per plot, and plots per variety, in order to increase our precision for future experiments. We also discovered some other variables which were affecting our results, including weather and unaccounted-for seed which had already shattered.

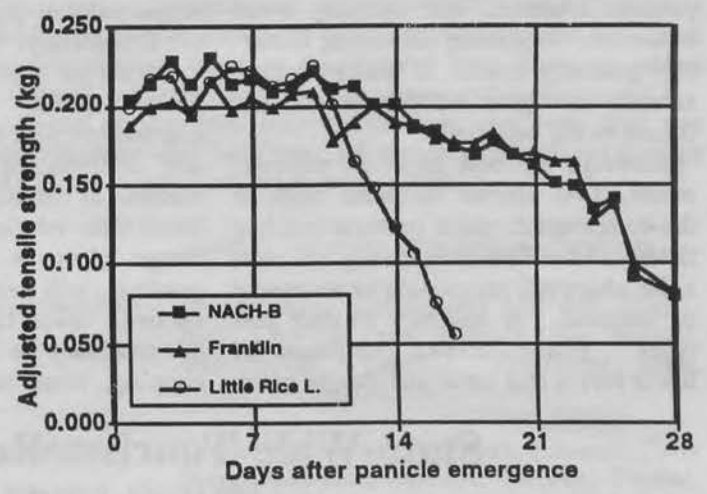


Fig 1. Seed tensile strength, measured during seed maturation, decreases at a much faster rate for a wild population (Little Rice L.) than for two nonshattering populations.

In 1996, Mr. Shaner returned, desiring to wrap up some of these unanswered questions. We designed a different follow-up experiment with only three varieties measured more frequently—six days per week. We tried to correct for weather related effects by measuring panicles of different ages, hoping the weather effects would be averaged out. We had more success correcting for already-shattered seed, as shown in Fig. 1. Overall, we saw that tensile strength started to drop dramatically in the wild lake variety after about ten days. The nonshattering cultivars declined more gradually until about 23 days after emergence, after which the decline was steeper—even shattering resistance failed eventually.

I will use this data to design future experiments where we want more precise comparisons among lines. I also hope to use the methodology to get new estimates of genetic variability in newer elite breeding populations. As a side benefit of the work, we developed a 0-4 rating scale for a "quick and dirty" estimate of actual shattering loss of individual panicles. For his part, Mr. Shaner has related his experiences to his classes and, at his invitation, I was able to share with them some of the challenges and rewards of plant breeding research on wild rice.

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Current information available from University of Minnesota Extension: <http://www.extension.umn.edu>.

# Buttercup in Pastures

Russell D. Mathison, Agronomist

Buttercup is a common weed in many northeastern Minnesota pastures. The weed not only reduces overall pasture productivity by competing with desired species but it is also toxic to grazing animals. The toxic compound in buttercup, protoanemonin, causes blistering, salivation, diarrhea and abdominal pain in livestock. Protoanemonin is very labile, meaning that it will degrade to a non-toxic form after the plant is cut. Therefore, ensiled or cured hay is not toxic because the toxic compound degrades so rapidly. Severe toxicity can lead to convulsions and death. Toxicity has been shown when buttercup species comprised 15 percent or more of the herbage in pasture. Animals will naturally avoid buttercup. In grazing situations, buttercup generally results in toxicity where animals are short on forage and are forced to eat buttercup.

Buttercups do best in moist environments. Two species represent most of the buttercups found in pastures and hay fields. Smallflower buttercup (*Ranunculus abortivus*) reproduces as an annual or biennial. It has two distinct leaf types - young, rosette comprised of lower leaves that are round, bright green

with round toothed margins borne on long petioles arising from the soil surface. Shoots arise with upper leaves divided into three to five leaflets on short petioles. Mature plants are from six to twenty inches tall with unique yellow flowers, having small yellow petals and seeds on a round or cone-like head. Tall buttercup (*Ranunculus acris*) is a perennial that reproduces by seeds. The stem is erect, branched, hairy and 1 to 3.5 ft. tall. Leaves are alternate, hairy and palmately divided into narrow segments. The flowers are usually bright yellow but sometimes cream-colored and have five to seven petals.

Buttercup control is best accomplished using an integrated approach, combining sound cultural practices with herbicide use if necessary. Management practices that maximize productivity of desired forage species will also maximize competition with buttercup. Soil testing and addition of plant nutrients via manure or commercial fertilizer combined with rotational grazing, allowing forage plants a rest period between grazings, will help maintain a productive, weed-free stand. It may also be necessary to follow grazing with clipping, since animals will probably

avoid buttercup. Clipping would interrupt the seed-production cycle.

If herbicide use becomes necessary, an excellent source of information is the Minnesota Extension Service Bulletin 3157-F, Cultural and Chemical Weed Control in Field Crops. When using a herbicide, it is very important to establish which particular species of buttercup is present. Small buttercup, because it is an annual or biennial, is best controlled when very small, either early in the spring as a seedling or in the fall of the first year when in the rosette stage. Tall buttercup, as a perennial arising from parent rootstocks, is best controlled with herbicides or clipping when at least six to eight inches tall and at the bud to bloom stage or beyond. Perennial weeds at more mature growth stages will translocate a higher proportion of applied herbicide to underground reproductive organs. Pre-bud to bloom roughly correlate to the period when sugars produced in plant shoots start to rebuild depleted underground root and storage organ reserves. Herbicides simply go where the sugars go and result in better perennial kill at this time.

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## State-Wide Tourism Research Agenda Advances

Dan Erkkila, Extension Educator-Tourism & Travel

The state's first research agenda crafted to meet the needs of the tourism industry hit the Minnesota legislature in February where it was introduced as House File No. 1377 and Senate File No. 1244. The companion bills appropriate \$875,000 in fiscal year 1998 from the general fund to the University's Tourism Center to research the needs of the tourism and travel industry in Minnesota in the following ways:

(a) \$235,000 is to fund a research project studying consumer behavior and how visitors make travel decisions in order to identify ways to increase visitors to the state;

(b) \$65,000 is to fund a research project to assess community capacity to deliver tourism products and services;

(c) \$60,000 is to fund a research project to identify and study laws, rules, and regulations that may burden tourism

and travel business operation and growth;

(d) \$80,000 is to fund a research project to study technology and its impact and role in tourism;

(e) \$325,000 is to fund a research project to study marketing techniques for the tourism and travel industry; and

(f) \$110,000 is to fund a research project to study environmentally oriented, nature-based tourism.

On the House-side, the bill was quickly assigned to, and unanimously passed out of the Commerce, Tourism and Consumer Affairs policy committee. Committee chair and lead author of the bill, Kris Hasskamp (DFL-Crosby), praised the initiative as a needed step for enhancing the tourism industry in the state. Finance committee hearings in the House's Economic Development and International Trade committee were

scheduled for April. The Senate bill was positively waved on to finance committee hearings from the Jobs, Energy, and Community Development committee (Chair Steven Novak DFL-New Brighton). Senator Linda Higgins (DFL-Minneapolis) is a member of that committee and is the lead author of the research bill in the Senate.

The Minnesota Office of Tourism and the University's Tourism Center have been working with the state's tourism and travel industry since early 1996 to develop a research agenda focusing on critical gaps in the level of understanding of the tourism and travel industry. Without precedence, the agenda has involved more than a dozen of the leading industry organizations. For more information about the agenda or legislative action related to it, contact Dan Erkkila at (218) 327-4361.

# Apple Winter Survival

David K. Wildung, Horticulturist

The winter of 1995-96 will be remembered as the coldest winter on record in Minnesota. The all-time state low minimum temperature of  $-60^{\circ}$  F was recorded at Tower, MN on February 2, 1996. While the official low temperature at Grand Rapids was  $-41^{\circ}$  F, we observed  $-53^{\circ}$  F in our strawberry plot area and other reports in the  $-50$  to  $-55^{\circ}$  F range were common in the Grand Rapids area. Temperatures of  $-40^{\circ}$  F or less were recorded on nine dates in our blueberry and strawberry plots during the 1995-96 winter. At the same time northern Minnesota received above average snowfall in January and February that protected herbaceous perennials, strawberries and blueberry plants from the record cold temperatures. Blueberry plots, in fact produced record yields in 1996 despite the record cold because of the deep snow.

In contrast, exposed plant tissue suffered much winter damage. No where was winter damage due to the record cold more evident than to fruit trees. In our orchard many trees were totally winter killed and almost all trees suffered some winter injury. I had many calls from people who lost trees or had trees badly damaged. Fruit production in our orchard that had reached an all time high during the 1994 and 1995 growing seasons was the lowest it had been in many years. Periodically 'test winters' provide a severe cold test for tree fruits and the winter of 1995-96 resulted in the worst winter kill I have witnessed in over 25 years. It truly was a 'test winter'!

While no one likes to see such severe tree death and damage, one of the values of the North Central Experiment Station is as a cold winter hardiness testing location and the winter of 1995-96 provided us an opportunity to evaluate apple cultivar hardiness. The table lists the relative survival of the cultivars in our orchard following the 1995-96 winter. Winter damage was worse on the so called "hardy" cultivars than would have been predicted. Anything in the best survival list should be considered very hardy and dependable for nearly any winters we may have in northern Minnesota. The intermediate list contains many cultivars we normally think of as being "hardy" and probably would survive most winters in northern Minnesota. Even some of the cultivars in the worst survival list have produced well in our orchard. Many of these trees were over 10 years old. There were a few things in the survival that should be noted that reinforced ideas we have already known. First, crabapples are much harder than large fruited apples. Among the best survivors were: Rescue, Dolgo, Chestnut, Whitney and Centennial Crabs. All except Dolgo are good eating crabs. Second, some of the old varieties of Russian origin are very hardy. Cultivars like Charlamoff, Antonovka and Hiberna have long been considered very hardy

and were used by old time orchardists as hardy framework trees years ago. If they only tasted good! Third, dwarf trees survived as well as standard trees. Trees died because of top damage. Most trees with dead tops had a root system that survived. Many root systems sent up shoots showing that the dwarf root system survived where the top died. Fourth, several McIntosh types are not hardy enough for most northern Minnesota locations. These include Britimac, Spartan, Killand, McLemore and Quinte. Lobo appears to be the hardest McIntosh type.

There were a couple of surprises in the survival patterns. The most surprising survivor was Honeycrisp. This new U of M release came through the winter well. While it would be great news if this fine quality apple exhibited superior hardiness, the trees are young and we need additional evaluation on them to say it truly is hardy. Perhaps the biggest disappointment was Mantet. Normally considered very hardy it suffered severe winter damage in two places in our orchard.

The ranking of the remaining cultivars in the list pretty accurately describes their relative hardiness based on survival from previous evaluations at our location. The survival ratings in the list should be considered the worst case scenario for winter hardiness damage. Then too, the winter of 1995-96 was the coldest on record and hopefully will not be repeated for many years.

If any of you have observations from your own fruit tree survival, write me a brief note. I'll report any significant findings in a future *North Central Quarterly* article.

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## APPLE WINTER SURVIVAL (1995-96)

Best Survival:	Rescue Crab, Dolgo Crab, MN 447, Charlamoff, Chestnut Crab, Whitney Crab, Folwell, ?Honeycrisp?, Garland, Centennial Crab, Carrol, Wellington.
Intermediate:	Oriole, Antonovka, Goodland, Hiberna, Early Blaze, State Fair, Duchess, Garrison, Caravel, Keepsake, Lakeland, Beacon, Haralson, Lobo, Victory, Wedge, Yellow Transplant
Worst:	Sweet Sixteen, Red Melba, Viking, Prairie Spy, Redwell, Connell Red, Fireside, ?Mantet?, Honeygold, Paulired, Early Red Bird, Britimac, Minjon, Red Baron, Collett, Lodi, Thorberg, Summerglow, Spartan, Killand, McLemore, Quinte

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## Civil Service Recognition Awards

On April 22, an all-staff meeting was held at the North Central Experiment Station and four staff members were recognized for their years of dedicated service to our station. **THANK YOU** and **CONGRATULATIONS** go to (l to r): Tom Carpenter, Horticulture Research Plot Coordinator, 35 years; Kay Sargent, Scientist-Horticulture, 15 years; Marian Mutchler, Accounts Specialist, 30 years; and Danny Swenson, Building and Grounds Worker III, 10 years.



# News from North Central

David L. Rabas

Spring has arrived! Winter slowly and reluctantly released its grip and allowed warmer temperatures and the sounds and smells of spring to break through. For those of us who stayed the course, it was a winter to be remembered for its deep snow and slow departure. For our "snowbird" friends it was one more reminder of why they chose Texas, Arizona or Florida as their winter home. We welcome them back and join with them in looking forward to an enjoyable and rewarding Minnesota summer.

In addition to the frogs and birds the sounds of spring at North Central include the bawling of new born calves. Calving should be largely completed when our readers receive this issue of the *Quarterly*. With the help of mother nature and some vigilant, skilled care by our animal research crew we expect to have 120 new angus calves in our herd by the end of calving season.

I am happy to tell you that our beef herd continues to grow and our beef

cow-calf research program is beginning to develop into an important asset for Minnesota's cow-calf industry. I am disappointed to announce that our animal scientist, Dr. John Hall, who has been so much a part of the successful development of our beef cow-calf research program, will be leaving our North Central family in August. Dr. Hall has accepted a beef extension and research position at Virginia Polytechnic Institute in Blacksburg, Virginia. The position provides an opportunity to serve a large Virginia cow-calf industry and to bring John and his family closer to parents and grandparents.

Dr. Hall's departure is a real loss to our beef research program. He has helped us come a long way toward developing the facilities and research directions that will become the nucleus of a potentially outstanding beef cow/calf research program at the University of Minnesota. I will be contacting beef producers later this spring to begin the process of finding

a scientist to continue to design and build a research program which addresses the needs of beef producers throughout our state and region.

As I mentioned in a previous *Quarterly* our North Central Research Fund completed a very successful Centennial Campaign. The campaign provided a \$50,000 base from which the interest will be used to support on-going research programs. We are now in the process of developing a fall campaign to raise funds to provide additional support to our horticulture research program. This additional support is needed to maintain a strong research program which better serves the needs of area gardeners and the horticulture industry. We hope that people interested in gardening and the commercial horticulture industry will support our fund efforts. If you are interested in assisting with the campaign or contributing to the horticulture research fund, please call 218/327-4490.

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## Alumni News All Class and Employee Reunion - July 19, 1997

Tom Carpenter



My wife and I took a little vacation in February and went to visit friends in Arizona. The alumni snowbirds had a luncheon while we were there and they all seemed to be enjoying their winter. Those attending the luncheon were Don & Irene Daley, Louie Kriger, Paul & Mary Warble and Paul's sister-in-law, Robert Ober and his wife, Tom & Gail Carpenter, Merrill & Margie Judkins, Alvin Reed, Wally & Jean Johnson, and Bobbi Lou Johnson. Sorry if I missed mentioning some of you in attendance--I tried to remember!

Now some important details on our reunion July 19. I will be mailing out information and a registration form

within the next week so look it over, fill it in, mark the date on your calendar and send it back as soon as you can to help me out with the entertainment seating. I have a roster of 355 alumni, faculty, and employees. If you know of anyone not receiving the registration form, please let me know. The price of \$13.50 is a real deal this year as we will be paying for the entertainment from our Alumni Fund. I have been going through the roster and we have alumni in 23 states. By the way, for those living in Apache Junction, AZ check out Louie's Produce, Wild Rice and Fruit. They even mail back to Minnesota!

Elva McClintick, 86, Grand Rapids

passed away on March 22, 1997. The funeral service was March 25. She did extensive volunteer work at the Grand Rapids food shelf and Salvation Army. Many of you will remember her as an assistant to "Doc" Stunck.

Wishing you good health and I hope to see your advance registration come through soon!!

### UPCOMING EVENTS

7/19	All Class Reunion
7/31	Wild Rice Field Day
8/27	Horticulture Day
9/04	Beef & Forage Day

POSTMASTER: Send address corrections to:

**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

**DR. DAVID L. RABAS, HEAD**  
Published February, April, July, November  
ISSN 0199-6347

by the North Central Experiment Station  
Grand Rapids MN 55744

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