UNIVERSITY OF MINNESOTA

The North Central Quarterly

Published by the North Central Experiment Station of the University of Minnesota

GRAND RAPIDS, MINNESOTA NOVEMBER 1991 VOLUME 61 NUMBER 4

A New, More Shatter-Resistant Wild Rice Variety

by Raymie Porter, Wild Rice Breeder

In October I met with the Crop Variety Review Committee of the University and obtained approval from them to increase the seed of an experimental population in 1992. My intention is to release this population, K2(2)C4, as a variety in the fall of 1992, contingent on its performance in variety trials at several locations in 1992. At that time it would receive a more suitable name.

K2(2)C4 originated (as the designation suggests) from a population of K2, and has undergone 4 cycles of phenotypic recurrent selection for seed retention, or shattering resistance. It is similar to K2, having medium height and medium to early maturity, but shatters less and yields more than K2 or other currently grown varieties. The table below shows yield and shattering of this population in comparison to other available varieties and to K2(1)C5, another experimental population selected for shattering resistance. Based on the data, K2(2)C4 is the most shatter-resistant population so far.

Yield and shattering summary for K2(2)C4 and other varieties, 1989-1991

Entry	VT-89 G. Rapids	VT-90 G. Rapids	VT-90 Aitkin	K2-90 G. Rapids	VT-91 G. Rapids	5-trial Mean
	lb/A(%)					
Meter	992 (18)	---	---	---	155(42)	
Voyager	878 (35)	---	---	---	394(32)	
Netum	603 (22)	---	---	---	453(24)	
K2(1)C#	1290 (25)	1310(26)	930(3)	1770(4)	1081(24)	1276 (16)
K2(2)C#	1315 (25)	1510(8)	800(12)	1530(3)	1017(17)	1234 (13)
K2 (Kosbau)	801 (38)	790(47)	400(39)	1170(11)	524(39)	737 (35)
K2 (Vomela)	1492 (19)	1330(38)	420(33)	---	---	
K2(Godward)	---	---	---	1240(9)	755(31)	
M1	1066 (35)	---	---	---	673(43)	
M3	601 (58)	1060(41)	660(14)	1490(9)	805(39)	923 (32)
Petrowske BB	1027 (42)	1360(31)	410(13)	1410(16)	967(32)	1035 (27)
Trial Mean	1019 (29)	1290(28)	610(18)	1310(12)	762(31)	
LSD (0.05)	308	530(10)	430(12)	340(4)		

The anticipated release, K2(2)C4, retains more seed longer than other currently grown varieties.

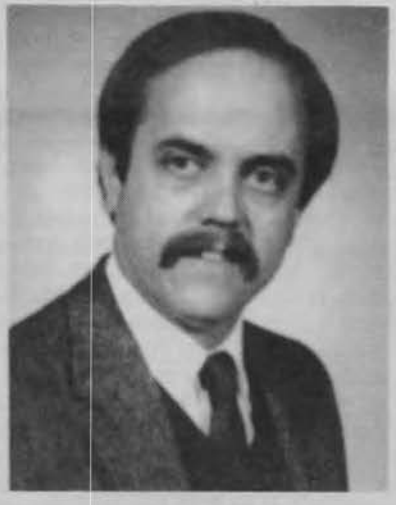
The data supporting this potential variety come mainly from variety trials on mineral soils, although the 1990 data from Aitkin (on a peat soil) is consistent with data from the other trials. Most wild rice growers have peat (or organic) soils. In 1992, we plan to conduct 3 additional variety trials on peat soils, as well as on the mineral soil at Grand Rapids, to confirm that the yield and shattering resistance of K2(2)C4 is superior in either environment. If so, the increased seed retention of this variety should allow the grower to harvest more grain than the other varieties tested. To date we have planted at two of these locations: Rennemo farm at Waskish, and Gunvalson/Imle farm at Gully. The other two sites will be spring planted at NCES, Grand Rapids, and at the U of M research paddies on the Vomela farm, Aitkin.

The Minnesota Crop Improvement Association has contracted with a grower to increase the seed of the potential variety. Given good growing conditions, we expect to have about 5,000 to 10,000 pounds of seed available to growers next fall, assuming approval for final release is given at the end of the 1992 season. In the meantime, growers wishing to purchase seed should place an advance order with MCIA between now and harvest time next summer.

Tourism and Travel Specialist Joins North Central Staff

Daniel L. Erkkila, his wife Erin and sons Mikko and Peter are recent additions to our North Central family and the Grand Rapids community. Dr. Erkkila is a 1991 graduate of the University of Minnesota College of Natural Resources with a major in forest economics and policy. His background includes work on natural resource related issues at the university, for state and federal forest agencies and with private industry. Dan's publications include timber supply analysis and economic assessments relating to forest utilization and the wood products industry in Minnesota. Dr. Erkkila will be responsible for conducting research in support of improved profitability in Minnesota's tourism and travel industry. His responsibilities also include research relating to community economic development as well as designing and delivering educational programs for businesses in the tourism and travel field.

Dan and his family are rapidly becoming part of our community. They live in the southwest area of Grand Rapids. Son Mikko attends first grade at Southwest school.



Daniel L. Erkkila

Dan's interests include hunting, fishing, cooking and amateur ("ham") radio. We are pleased to welcome Dan and his family to the North Central Experiment Station and the Grand Rapids community.

Potential Financial Returns from Hybrid Aspen

Gary Wyckoff, U. of MN Aspen/Larch Program Manager
Howard Hoganson, U. of MN Research Forester

Hybrid aspen offers the potential to increase yields per acre and shorten forestry rotations. Currently, aspen stands harvested in Minnesota yield about 15 cords per acre on average. Foresters believe that better management can double these average yields without increasing the rotation length beyond the 40 to 45 year recommended length. Hybrid aspen offers potential for reducing rotation lengths to about 20 years and still produce 35 to 45 cords per acre. However, like all investments in intensive forest management, investors must be willing to take some risk as investments are subject to potential insect, disease, or weather problems. A look at the possible financial returns from hybrid aspen is an important first step for those potentially interested in investing. A simple financial analysis can also help put research needs in better perspective.

Assumptions

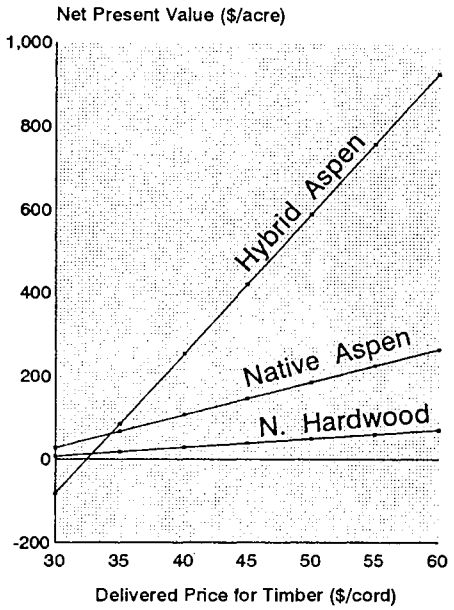
Hybrid aspen is generally not considered as a replacement for native aspen on native aspen sites as most of these sites can be relatively productive with very little management. Fertile, well-drained, northern hardwood sites are generally considered better sites as many of these sites have relatively slow growth rates. In some areas of Minnesota where the aspen forest type dominates, converting acres of northern hardwoods to aspen could raise concerns about biodiversity. A counteracting strategy might be to hold more poorly-stocked and poorly accessible acres of the older aspen stands to allow them to convert naturally to other hardwoods. Another strategy might be to focus some conversion on good native aspen sites where growth potential is not being realized.

Here, we will summarize recent financial analyses performed to examine the potential of planting hybrid aspen on sites that would naturally regenerate to either northern hardwoods or native aspen. Our discussion will be kept simple with the assumption that potential planting sites have already been harvested.

Benefits and costs from managing sites for either native aspen or northern hardwoods served as a baseline. The baseline alternatives involve no establishment costs or management costs other than minimal costs for monitoring and fire protection. The northern hardwood alternative was assumed to follow a 60-year rotation with a yield at rotation of 20 cords per acre. The native aspen alternative was assumed to follow a 40-year rotation with a yield at rotation of 30 cords per acre. The rotation length for hybrid aspen was assumed to be 20 years.

Hybrid aspen establishment costs were assumed to equal $200 per acre. This cost includes planting costs and site prep costs that would likely involve both chemical and mechanical treatments. Land costs are not considered directly in this analysis as the sites are assumed to remain in timber production if hybrid aspen is not planted. Hybrid aspen establishment costs were considered a one-time cost occurring only at the start of the first rotation as hybrid aspen will regenerate naturally after it is harvested. Hybrid aspen yields from all rotations were assumed to equal 40 cords per acre. An infinite planning horizon was used with the assumption that prices and costs would remain constant over time. The discount rate, net of inflation (real rate), was assumed to equal four percent.

Figure I. Comparison of the sensitivity of returns to future timber prices.



The analysis valued timber using delivered mill prices and considered all costs incurred to deliver wood to the mill. Future prices for northern hardwoods, native aspen and hybrid aspen were assumed to be equal. Tests by the University of Minnesota Aspen/Larch Cooperative suggest that the hybrid aspen is better than native aspen for papermaking, and thus this price assumption is likely conservative. Harvest costs for all species were assumed to equal $20 per cord and transport costs were assumed to include a fixed cost of $5 per cord plus a variable cost of $.15 per cord per mile.

Results

A primary objective of the analysis was to test the sensitivity of results to the assumptions. Results were found to be very sensitive to assumptions about future timber prices. Results are also sensitive to stand location as a per cord increase in transports cost is equivalent to a per cord decrease in delivered price. For a stand assumed to be located 10 miles from a market, figure 1 compares, over a range of wood prices, the discounted net benefits of hybrid aspen to the discounted net benefit of the other species. The value of converting a northern hardwood site to hybrid aspen is simply the difference between the corresponding values shown in figure 1. Of interest is the much steeper slope of the line for hybrid aspen. This indicates that returns from hybrid aspen are very sensitive to price with potential for high returns if wood prices are high. Results indicate that hybrid aspen investments could break even with delivered prices at approximately $35 per cord and potentially return $540 more per acre ($590 - $50) on northern hardwood sites and $395 more on good aspen sites ($590 - $185) if delivered prices are $50 per cord. Delivered prices for aspen in northern Minnesota are currently about $35 per cord. Future prices are difficult to predict, but higher prices seem likely.

Although not shown in figure 1, analyses were also performed to examine the impact of the assumed annual growth rate for hybrid aspen. With a .25 cord per acre increase (decrease) in the annual growth rate, the hybrid aspen line in figure 1 would shift up (down) approximately $15 per acre at the $30 per cord price and $100 per acre at the $50 per cord price.

Research Implications

Results suggest potential for high profits per acre from investments in hybrid aspen. While further increases in hybrid growth rates could improve potential returns, factors more likely of concern are the potential risks associated with investments and barriers to implementation. To help reduce risks, research by the University of Minnesota Aspen and Larch Cooperative is developing a number of suitable hybrids to increase genetic diversity and the associated resistance to catastrophic events. Plantings in the future will likely contain a number of hybrids. Research will also focus on better identifying the potential of sites for hybrid aspen and the best silvicultural practices. Increased information will help reduce the risk of plantation failures. Work is also focusing on methods to develop better propagation methods so that quality planting stock can be produced in quantity. Many of these research objectives are long-term in nature, yet recent research planning has indicated that limited research budgets will delay the process significantly.

Farm Safety Projects Initiated

James J. Boedicker, Agricultural Engineer

Making farm machinery safer is the aim of a new agricultural engineering research project recently approved by the Minnesota Agricultural Experiment Station. The specific objective of the project is to develop designs for improved safety devices that will reduce incidence of injury to operators of farm machines and to persons near farm machines. Leading the project are Drs. Cletus Schertz, John Shutske, and Jonathan Chaplin with the Agricultural Engineering Department in St. Paul, along with this writer.

The project was developed in response to increasing concern about persistently high accident rates on U.S. farms. Despite attempts on many fronts over the last 20 to 30 years to improve farm safety, statistics show farming continues to be among the most hazardous of occupations. According to the National Safety Council, farm workers in the U.S. are killed or injured at four times the rate for non-farm workers. In 1989, more than 1,300 farm workers died in work-related accidents and a hundred times that many suffered disabling injuries. Some 35 to 40 percent of farm injuries involve machinery.

Many factors contribute to farming's poor safety standing. Among these are disproportionately high percentages of younger and older workers engaged in farming; extreme environmental conditions (heat, cold, noise, dust, etc.) in which work is often performed; increasing equipment complexity, size and power; inadequate equipment maintenance including missing or damaged shields and other safety devices; inadequate training; the wide diversity of farm tasks; the extreme physical exertion required for many tasks; the seasonal nature of many activities; long hours, high stress and fatigue; and somewhat lax attitudes toward safety in general. Clearly, efforts to improve equipment safety, although important, attack only part of the problem.

Fortunately, work to improve most aspects of farm safety is progressing all over the country. For example, since our project was approved, it has been incorporated into a much larger project developed by the National Farm Medicine Center (NFMC) affiliated with the Marshfield Clinic in central Wisconsin. This project, funded by the National Institute for Occupational Safety and Health (NIOSH), incorporates several different projects involving personnel with the NFMC, the Marshfield Clinic, and the universities of both Wisconsin and Minnesota. The other farm safety issues being addressed under the project are cumulative trauma disorders in general (muscular/skeletal related injuries), back injuries and chronic back pain in particular, hearing conservation for agricultural youth, parental protection of children from agricultural hazards, and professional agricultural health and safety education and training. Under the NIOSH project, we at the University of Minnesota in our work with improved safety devices for farm machines, will be cooperating with agricultural engineers at the University of Wisconsin.

The first step in our research process, now under way, is to identify and to prioritize safety devices for developmental design. A large number of possibilities exist and obviously we cannot attack them all. A partial list of those "devices" presently being considered for development are improved shielding of input implement driveline (PTO shaft), improved lighting and marking, active seat belt for tractors equipped with a rollover protective structure (ROPS), safe retrofit jump-start terminals, automatically engaging struts to prevent failure of hydraulic support systems (combine headers, folding tillage implement sections, etc.), brakes for towed equipment and noncontact barrier systems to shut equipment down when someone enters a hazardous zone.

Criteria for selecting devices for development include exposure level, cost/benefit ratio, likelihood of success, potential user/industry acceptance, legislative interest, and personal interest of the researchers. At present, the choices are far from being clear-cut as to which problem areas we should tackle, either immediately or over the longer term. We do plan to solicit the help of industry in the selection and development processes.

Design development itself can be a complex process involving development of concepts to solve the problem, selection of the most promising concepts, designing, building, testing, evaluating, modifying, retesting, etc. Some of the testing might be done at this station under actual farmlike conditions. We hope the work will lead to devices that will eventually be incorporated into farm machinery that is safer to operate and to maintain than machinery now available.

Reducing farm accidents, however, entails far more than simply adding safety devices. Many farm accidents can be easily prevented by paying more attention to the risks existing around the farm and taking deliberate steps to reduce those risks. Examples include replacing missing or damaged shields; keeping children away from dangerous machinery; prohibiting extra riders on tractors; keeping electrical systems in repair; and using eye, hearing and respiratory protection devices, among others.

Request for Information on Sites of Purple Loosestrife

Robert F. Nyvall

Part of my research concerns the biological control of purple loosestrife. Purple loosestrife is an exotic weed which is of no value to wildlife that is invading wetlands and crowding out the beneficial native vegetation. At present, this weed is controlled through the application of expensive chemical herbicides to wetland sites. Eventually it is hoped to find a fungus that will act as a mycoherbicide and control this weed without the use of chemical herbicides.

A portion of my research concerns the identification of purple loosestrife sites. The plants at these sites are examined for any possible pathogen and isolations made for candidate fungi that could be developed as a mychoherbicide.

I would appreciate knowing of such purple loosestrife sites, particularly in northern Minnesota. If you know of purple loosestrife sites, please identify them and send directions on how to find the site to:

Dr. Robert Nyvall, U. of Minnesota
North Central Experiment Station
1861 Highway 169 E.
Grand Rapids, MN 55744.

Thank you in advance for your help in controlling this weed.

North Central Ski Trail

According to Tim O'Brien, forestry plot coordinator, the early snowfall provided good cover for the cross country ski trail at the experiment station. Visitors are welcome to enjoy the well-signed trail that wanders through the forested area. Use the Itasca Community College entrance road to drive to the parking lot at the beginning of the trail. Maps of the trail are provided for skiiers. If you have questions stop at the North Central office building. Enjoy the winter!

Grand Rapids Vinterslass cross country skiers enjoy NCES trails.

News From North Central

David L. Rabas, Superintendent

Winter arrived on Friday, November 1, at the North Central Experiment Station. The arrival of winter occurred a few weeks sooner and with a great deal more vigor than expected. More than a foot of snow fell in a twenty four hour period. Blowing snow and temperatures in the teens created snow removal and animal care problems. Fortunately much of our fall field work had been completed. By Monday, November 4, the North Central crew began getting organized to deal with the winter chores they had hoped were at least three weeks away. Thawing frozen pipes, moving animals to shelter and preparing and repairing snow removal equipment were problems common to many rural residents as this sudden blast of winter arrived in a large portion of our state and region.

The arrival of winter marked the end of a good crop year and a productive research season at North Central. Moisture and temperature conditions were favorable for hay, small grain and corn crops and provided good conditions for crop and livestock research projects.

There were a number of "burning issues" at the North Central Experiment Station this summer, but none so obvious as the machinery storage building shown in the photo. After many phone calls, forms and permits and with the excellent cooperation of the Grand Rapids Fire Department we were able to arrange for a controlled burn of this old machinery storage building. The full history of the building is not clear. Perhaps some of our School of Agriculture alumni or former NCES staff will remember this old building. It was constructed in 1935 or earlier and used as a livestock housing facility. In 1942 it was remodeled and has been used as a machinery and vehicle storage area for many years. The building was demolished because the stone and concrete walls of the building wer beginning to crumble and there was concern about the structural safety of the building under snow load. In addition, its location presented a safety hazard as it blocked visibility on a road used by vehicles and farm equipment. Burning the structure saved considerable demolition costs. The walls, foundation and floor have been removed and the area has been backfilled and sloped to fit with existing grades. Grass and other plantings will be made in the spring.

Controlled burn of storage building.

Legislative funding for experiment station research continues to decline. Grants and gifts are becoming increasingly more essential sources of research support. Your continued support for our station through our NCES Research Fund will become an essential source of dollars to invest in future research programs at our station.

I would like to take this opportunity on behalf of our staff to wish the School of Agriculture alumni, former staff and other friends of the North Central Experiment Station a very Happy Holiday Season and a successful New Year. I would add a personal thank you for the kind words and support many of you have offered me as I continue in my new job as superintendent at your experiment station. I look forward to the challenges and opportunities of 1992.

Alumni News

Tom Carpenter

The reunion in July was successful with a good turnout of 147. I was looking through the registration and there were 47 from the class years 1929 through 1950. And to let you younger alumni know, Vernon Nelson, Class of 1929, stayed for the last dance. (I think he wanted a door prize.) We all enjoyed our guest speakers, Dr. W. Richard Dukelow, former animal scientist and teacher and Margaret Matalamaki, former teacher and chair of the North Central Research Fund. I would like to thank both of them for their information.

At the meeting we discussed using some of our alumni funds for a scholarship. I will be making contact this winter on the right way to do this so we can help educate someone in agriculture.

At the present time, I am trying to get a light to shine at night on our monument at the Itasca Community College.

Jim Witte, Class of 1938, died on June 6, 1991. He was a Holstein breeder, A.I. technican and dairy farmer. Our sympathy is extended to his wife Valeria, who lives in Munger, Minnesota and to his family.

Paul Warble, Class of 1940 and his wife Mary received a 1991 National Community Service Award from the American Association of Retired Persons. Paul is the president of the Bemidji Senior Citizens and he and Mary serve as instructors in the AARP 55-Alive defensive driving course. We enjoyed talking with the Warbles at the reunion.

Anyone who would like an up-to-date list of alumni addresses, drop me a line and enclose a self-addressed stamped envelope (4x10 in.) and I will send you one.

Hope all you snowbirds enjoy a nice warm winter. If you have any alumni news, be sure to write.

Seasons Greetings from the Staff at the North Central Experiment Station

The North Central Quarterly

Issued by
THE UNIVERSITY OF MINNESOTA
North Central Experiment Station
1861 Hwy. 169 East
Grand Rapids, Minnesota 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, Minnesota

Second-class postage paid at Grand Rapids, Minnesota

MARLYS MCGUIRE
ST. PAUL CAMPUS LIBRARY
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ST. PAUL MN 55108