NDSU NORTH DAKOTA STATE UNIVERSITY

Written Testimony to Legislative Council
October 31, 2012

State Board of Agricultural Research and Education (SBARE)
NDSU Extension Service
ND Agricultural Experiment Station

We are pleased to submit written testimony to the Legislative Council for their review of the annual activities the State Board of Agricultural Research and Education (SBARE), the NDSU Extension Service (EXT), and the North Dakota Agricultural Experiment Station (NDAES). This testimony contains the following:

1. A summary sheet identifying the current status of all General Fund Initiatives for both EXT and NDAES, including capital improvement projects;
2. Status and update of activities for FY 2012 of the Soil Health Initiative provided by the 62nd Legislative Assembly;
3. A list of Major Accomplishments of EXT and NDAES for FY2012;
4. A copy of the 2011 Annual Highlights, describing select activities of EXT and NDAES during FY2012;
5. A statement by Mr. Rodney Howe, Chair, SBARE, outlining the activities of SBARE in 2011-12 as it pertains to the development of the budget initiatives for EXT and NDAES for the 2013-15 session;
6. A list of SBARE initiatives and Capital Improvement projects for both EXT and NDAES approved by the SBHE.

Please do not hesitate to contact us if you have any questions or require further information.

Ken Grafton
VP, Dean, and Director

Chris Boerboom
Director of Extension

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Update of 2011 General Fund Initiatives

2011-2013 Biennial Budget

General Fund Projects:	EXT	AES	Total	Status
Costs to continue FY2011 salary increases	$508,356	$1,079,647	$1,588,003	Allocated
Greenhouse utilities	$0	$173,622	$173,622	Added to previous biennium funding; Allocated
Equipment, REC and Main Station revolving equipment funds	$0	$200,000	$200,000	Allocated
Main Station operating funds allocation per SY	$0	$410,000	$410,000	Added to previous funding; Allocated
Graduate research stipends	$0	$720,000	$720,000	Allocated
Office support staff	$0	$550,000	$550,000	5.0 FTE at Main Station; hired
Scientist-canola breeding/genetics	$0	$210,000	$210,000	1.0 FTE at Main Station; recruitment in process--offer stage
Research specialists-livestock stewardship	$0	$240,000	$240,000	2.0 FTE at Main Station; hired
Infrastructure: technical support	$450,000	$0	$450,000	3.0 FTE technicians; hired
Soil health and land management	$690,000	$0	$690,000	2.0 FTE area specialists + operating and 1.0 state specialist; hired
Livestock specialist-Livestock Stewardship	$250,000	$0	$250,000	1.0 FTE state specialist + operating; hired
State Soil Conservation Committee	$150,000	$0	$150,000	
Special assessment	$0	$82,402	$82,402	12th Ave. N biennial payment; FY 12 assessment paid
Director-Williston REC- contingency appropriation	$0	$210,000	$210,000	Hired
Dickinson REC operating pool	$0	$800,000	$800,000	Allocated.
Research greenhouse complex	$0	$6,991,650	$6,991,650	Under construction.
Enhancing soil productivity & land mgmt for future North Dakotans:	$0	$1,410,000	$1,410,000	
School of Natural Resource Sciences				1.0 FTE scientist + operating and 1.0 FTE research specialist; scientist hired
Hettinger REC				1.0 FTE scientist + operating and 1.0 FTE research specialist; hired
Carrington REC				1.0 FTE scientist + operating and 1.0 FTE research specialist; scientist hired, res. spec in recruitement process
Williston REC				1.0 FTE research specialist; hired
Central Grasslands REC				1.0 FTE research specialist; hired
Ag & Biosystems Engineering				1.0 FTE research specialist; hired

Updated as of 10-23-2012

NDSU NORTH DAKOTA STATE UNIVERSITY



Soil Health | Land Management | June 2012

Personnel Hired

Dr. Ann-Marie Fortuna | Research Soil Health Assistant Professor
NDSU Soil Science Department, Fargo
Starting July 15, 2012

Dr. Fortuna received her PhD (2001) in Soil Science from Michigan State, and has been an assistant professor at Washington State for the past four years. She has been awarded over $6.8 million in grants and published 16 peer-reviewed journal articles.

Her research at WSU integrated soil health, nutrient cycling, long-term ecosystems management, and microbiology; improving soil quality and managing nutrient efficiency.

Dr. Abbey Wick | Extension Soil Health Assistant Professor
NDSU Soil Science Department, Fargo
Starting July 15, 2012

Dr. Wick received her PhD in 2007 from University of Wyoming and has worked at Virginia Tech since 2008. She has 10 peer-reviewed publications, 12 outreach publications, and $279,000 in funded grants.

Dr. Wick brings extensive experience in working with landowners and industry on issues ranging from soil fertility and physical limitations of soils on crop production to best management practices for reclaiming mine lands.

Chris Augustin, M.S. | Area Extension Soil Health
North Central REC, Minot
Started March 19, 2012

Mr. Augustin received both his MS (2009) and BS (2005) from NDSU. His MS research emphasized the relationships between carbon sequestration and soil texture. Most recently, Mr. Augustin has worked for NDSU at the Carrington REC. He has significant extension experience on various aspects of nutrient management and soil health.

Naeem Kalwar, M.S. | Area Extension Soil Health
Langdon REC
Started March 12, 2012

Mr. Karlwar received his MS (2010) in Land Resource Science from the University of Guelph in Ontario. He comes to NDSU Extension with a wealth of experiences in (i) preventing and mitigating soil salinity and sodicity, (ii) applying practices to improve soil health and management, (iii) extension outreach, and (iv) project management.

Jasper Teboh, Ph.D. | Soil Scientist
Carrington REC
Started April 1, 2012

Dr. Teboh graduated from NDSU in 2007 with a PhD in Soil Science and worked as a Research Associate in the School of Plant, Environmental and Soil Sciences at Louisiana State University from 2007 and 2012. Dr. Teboh returns to NDSU with rich working experience in soil fertility and nutrient management research.

Ben Geaumont, Ph.D. | Wildlife & Range Science Research Assistant Professor
Hettinger REC
Started July 11, 2011

Dr. Geaumont received his PhD in 2009 from NDSU and worked as a post-doctorate research fellow at the Hettinger REC from 2009 to 2011. He has 2 peer-reviewed, 4 outreach publications, and PI or co-PI on funded grants totaling $5.6 million. His research focuses on the interactions between wildlife and agriculture and the thresholds between the two.

Support Staff Hires

Hettinger REC: Jeffery Stackhouse, M.S., Wildlife and Rangeland Research Technician, June 1, 2012.
Central Grasslands REC, Streeter: Matthew Danzl, Forage Agronomy Research Specialist
Agricultural & Biosystems Engineering, Fargo: Md Saidul Borhan, Ph.D. Soil Health Technician, Dec. 7, 2011
School of Natural Resource Sciences, Fargo: Position is still open
Carrington REC: Position is still open
Williston REC: Position is still open

NDSU Personnel have been awarded over $5.3 Million to work on soil health & land management related topics. Another $6.07 Million has been submitted.

David Franzen and **Abbey Wick.** 2012-2015. Eastern North Dakota Soil Salinity Specialist- Years Three, Four and Five. EPA 319. $191,921

Hargiss, C., J. Norland, E. DeKeyser, T. DeSutter, and F. Casey. 2012-2014. Estimating the Impact to Wetlands in Western North Dakota from Dust and Road Use Increases Due to Energy Development. ND Dept. of Health. $97,599

Hopkins, D., and D. Steele. 2011-2012. Impacts of Climate and Erosion on Soil Change: Implications for North Dakota Soil Quality. USDA-NRCS National Soil Survey Center. $40,000

Maddock, R., K. Sedivec, R. Littlefield, C. Schauer, **B. Geaumont**, G. Halvorson, M. Monoh, P. Johnson, K. Olson, R. Gates, M. Liebig, D. Archer, J. Hendrickson, J. Garden-Robinson, and L. Xu. 2011-2016. Renewal on the Standing Rock Sioux Reservation: Land, Cattle, Beef, and People. USDA NIFA-AFRI. $5,000,000

Jia, X., DeSutter, T. M., Scherer, T. F., and Steele, D. D. 2012-2013. Subirrigation with high sodium adsorption ratio groundwater and its effect on soil and water quality. ND State Water Commission. $7,225

Soil Health Advisory Group formed

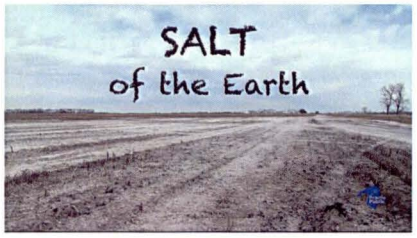
Mission: The mission of the Soil Health Advisory Group is to help guide and prioritize soil health research and extension efforts directed by NDSU; to provide networking opportunities among NDSU, state and federal agencies, retail partners, and commodity-grower groups; and to help increase the awareness and importance of soils to North Dakota's vitality. By providing the public and scientific communities evidence for adaption to changing soil environments, North Dakota's land managers will be better suited to adapt to changes in climate, cropping systems, and environmental situations.

***The purpose*:** Help land managers adapt to changing soil conditions

***The business*:** Networking, research, education

***The values*:** Good soil health is needed to maintain or improve North Dakota's economic prosperity and to minimize environmental impacts caused by land management practices

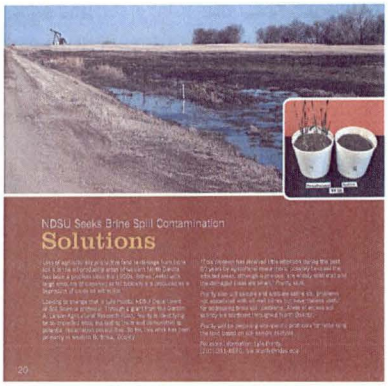
Recent Features on Soil Health | Land Management



Prairie Public's ***"Salt of the Earth"*:** Features NDSU Soil Science faculty and its graduates explaining soil salinity in ND.

KX News' story **"Eye on Agriculture: Saline Soil"**

Features Soil Health staff, Chris Augustin talking about managing soil salinity.



Brine Spill Contamination

NDSU Soil Science personnel worked on the issue of land that was affected by oil field brine spills

Soil Health Beyond North Dakota

Mn NPR featured a story on Guard troops receiving a soils short course with NDSU's Dr. Jay Goos. Guard members will be deployed to Afghanistan to rebuild its agriculture.

Major Accomplishments – NDSU Extension Service

630 NDSU Extension Service

1. **Cropping Systems** educational programs enabled North Dakota growers to efficiently produce over $6 billion of crops. New Extension nitrogen fertility recommendations for wheat have provided better results according to 98% of surveyed consultants and ag industry representatives. Education on wheat stem sawfly was estimated to save wheat growers $30 million in insecticide costs in 2011.Over 1,500 people were educated in 2011 on subsurface drainage systems to address soil salinity and excess water. Attendees of soybean meetings estimated $2 million of benefits from new production ideas in 2011.
2. **Livestock Management** programs supported a beef cattle industry that is poised for expansion. 2011 survey results on beef educational activities indicated 71% of producers receiving information increased productivity or production, 39% decreased their labor needs, 56% increased calf value, and 62% increase net income.
3. **Disaster Preparation and Recovery.** The 2011 flooding impacted every river basin in North Dakota and displaced residents—12,000 in Minot, alone. From proper sandbag dike construction to restoring flood-damaged structures to financial recovery, Extension fielded calls for assistance; created and posted 14 flood clean-up videos; helped create a Disaster Recovery Log smartphone app; and co-developed and put to extensive use a Family Financial Toolkit.
4. **Community Economic Development and Leadership** programs focused on enhancing value-added agriculture, building community leadership and addressing poverty of rural communities. Communities raised over $1.8 million to support local issues and have completed numerous business projects.
5. **Energy Development** programs provided educational assistance and technical support to rural western North Dakota communities impacted by oil development. Extension's Center for Community Vitality held four "Taking Charge of Your Community's Future" forums that educated 725 individuals on community planning and oil leases.
6. Provided educational assistance on parenting issues to over 6,550 parents through regional Parent Resource Centers and the Gearing Up for Kindergarten program.
7. **Food and Nutrition and Health** programs targeted North Dakota families at risk for food insecurity, diabetes, obesity, eye disease and other health issues. These programs have improved the nutrition of families, increased wise choices of dollars spent on food, increased physical activity and improved safe food-handling practices. Every dollar invested in nutrition education in North Dakota reduces limited-resource families' health-care costs by $8.82.
8. **4-H and Youth Development** programs engaged more than 21,000 North Dakota youth in club, summer camp, and after-school activities. Research shows that 4-H youth who gain the life skills and experiences provided through these programs are three times as likely to be active in their communities, nearly twice as likely to attend college and 56% more physically active.
9. **Master Gardener** programs reached 3,335 adults in N.D. through 1,500 volunteered hours and engaged 3,500 youth from 35 N.D. counties in the Junior Master Gardener program.
10. **Extension Agents and Specialists** made over 500,000 face-to-face educational contacts in North Dakota during the 2011 programming year.

Major Accomplishments - NDAES

628 Branch Stations

Dickinson Research Extension Center (DREC)

1. Continued work in four research and extension areas: agronomy, beef management, range management, and sustainable agricultural practices.
2. Reported conventional and organic agronomic research and extension information regarding various management techniques involving tillage (conservation tillage and no-till), cropping systems, pest control systems, variety development and the integration of cover crops.
3. Reported grassland research information regarding various management techniques involving grass cultivars, ornamental xeriscape, soil mineral nitrogen, prairie ecosystems, drought, grassland restoration, grazing systems, burning and the integration of beef cattle.
4. Reported beef research and extension information regarding various management practices involving winter forage replacement strategies, effects of heifer frame size and forage based diets on development and yearling steer performance on extended grazing annual forages.

Central Grasslands Research Extension Center (CGREC)

1. Conducted studies on plant respiration and photosynthesis in response to grazing.
2. Continued projects on control of invasive grass species through grazing.
3. Collaborated with multiple on-campus faculty and scientists at other REC's on livestock projects evaluating breeding systems, range supplementation, and meat quality.
4. Conducted research projects evaluating a multitude of forage species for use in the northern plains. Additionally, continued forage based biofuels research at sites across the state.
5. Obtained funding to develop management practices allowing for increased use of distillers dried grains with solubles in range settings.
6. Hired technical support for the forage agronomy program.

Hettinger Research Extension Center (HREC)

1. Distributed foundation seed produced at NDSU research centers, making new varieties available to southwest North Dakota producers.
2. Conducted crop trials and pesticide trials as well as off-station variety testing at Regent, Scranton, New Leipzig, Selfridge, Reeder, and Mandan.
3. Evaluated new varieties and technologies for growing drought tolerant corn and wheat, wheat stem sawfly resistance, and new and emerging bio-fuels.
4. Conducted multiple land use research evaluating sharp-tailed grouse habitat, reclamation of low-quality farmland back to native grasslands through the use of cover crops to improve soil conditions, and grazing systems that included both wildlife habitat and agricultural outputs.
5. Collaborated with Sitting Bull College on the Standing Rock Sioux Reservation, the USDA-ARS in Mandan, NDSU, and SDSU on a new multi-agency research and outreach project evaluating the reclamation of lands degraded by prairie dogs, and the feasibility of producing a Tribal beef product that is produced from birth to plate on the Standing Rock Sioux Reservation.

6. Conducted research evaluating feeding technologies for cattle and sheep that improved reproductive efficiency, improved feedlot performance and decreased feed costs, and affected male reproductive performance in response to different feed types.
7. Provided educational opportunities to livestock and crop producers such as the Crop Tours and Field Day, Dakota Ram Test, Shearing School, Wool Classing School, Ultrasound Certification School, and multiple rangeland, beef, and sheep schools.

Langdon Research Extension Center (LREC)

1. Continued to provide dependable and unbiased applied research results in all aspects of crop production for all crops grown in northeast North Dakota.
2. Fostered strong research partnerships with agricultural input companies, commodity groups and others to give producers better information regarding which inputs to employ and which crops to grow in their operation.
3. Produced the highest quality foundation grade seed of the major crops grown in our region for seedsman and producers through Langdon's foundation seedstocks program.
4. Pursued value added agricultural opportunities with local economic development groups that may lead to new high value cropping system opportunities for producers and economic enhancements for rural communities.
5. Provided dependable support for main station breeding programs and other cropping system research based out of the main campus that benefit producers for the entire state.
6. Added two new Extension outreach programs in agronomy and soil health that bring a strong outreach program to address critical needs to the regions producers.

North Central Research Extension Center (NCREC)

1. Continued to play key role in the strategic planning and production of foundation seed in the region. The center produced, conditioned, and distributed foundation seed of varieties including Pinnacle and Tradition barley; Omega and York flax; Divide, Grenora, and Tioga durum; Barlow, Glenn, RB07, and Velva hard red spring wheat; Decade, Darrell, and Jerry winter wheat; and Jury oat.
2. Researched new crop protection products for minor crops such as sunflower, safflower, dry pea, lentil, chickpea, canola, mustard, and flax.
3. Researched new products for controlling noxious weeds in non-cropland areas such as yellow toadflax, Canada thistle, and leafy spurge.
4. Conducted residue trials with the USDA IR-4 that will lead to registration of new pesticides for controlling weeds and insects in minor crops.
5. Conducted studies in several crops to identify weed control alternatives in response to development of weed resistance.
6. Researched production practices and genetic improvement of 42 different crops.
7. Researched *Brassica carinata* (Ethiopian mustard) lines for potential jet fuel and biodiesel use.

Williston Research Extension Center (WREC)

1. Evaluated the performance and adaptation of new and established crop cultivars and crop cultural practices to improve productivity of agricultural products and reduce inputs.
2. Conducted research and demonstration projects on potatoes, malting barley, safflower, spring wheat, and winter wheat variety developments, safflower disease control, pulse crop

production and variety selection, horticultural crops, sprinkler irrigation, water and crop management.
3. Conducted bioenergy crop research on barley and sugar beets for ethanol and biomass production from switchgrass and other perennial herbaceous crops.
4. Utilized a 160-acre irrigated site in the Nesson Valley Irrigation District for an irrigated research and development project on sustainable irrigated cropping systems to increase irrigation profitability; promote irrigation development and support food processing industries in North Dakota.
5. Dedicated the Neil Riveland Research Laboratory Addition to the Ernie French Center at the WREC Field Day in July 2011 and occupied for use in October 2011. The research laboratory addition provides updated seed sample processing/cleaning facilities, office space and soils, irrigation research and horticulture crops laboratories.
6. Organized and assisted with outreach programming opportunities in the region: National Hard Spring Wheat Show, MonDak Pulse Day, Western Crop/Pest School, Irrigation Workshop, off-station trials and tours, field day events and the MonDak Ag Showcase.
7. Collaborated with NDSU researchers and seed companies to evaluate grapes, floral and vegetable crops. The WREC garden is listed as a display garden for All America Selections. Sweet potatoes have been evaluated as an alternate crop.

Carrington Research Extension Center (CREC)

1. Investigated practices to optimize corn fertilizer management with intensive management, in-furrow, top-dress and secondary fertilizer research projects.
2. Assessed response and economics of soybean production strategies that utilize combinations of cultural practices and crop production inputs.
3. Established grain and forage crops across a soil salinity gradient to assess tolerance based on plant survival and performance.
4. Provided training for over 50 private and cooperative crop consultants during the 2011 CREC Crop Management Field School.
5. Partnered with North Dakota angus producers to form North Dakota Angus University, a research program that facilitates CREC feedlot research and expands producer's knowledge of herd performance.
6. Determined that self-feeding is a viable option for smaller-scale cattle producers who want to finish cattle in a collaborative project with the HREC.
7. Determined that raising beef cattle in a drylot system is a viable alternative beef management practice.

640 - Main Station

1. Continued breeding, disease and insect tests, fertility tests, responses to weed pressure, determination of desirable agronomic processing and products, and economic impacts for 14 major crops and several new crops. Released hard red spring wheat (HRSW) cultivars that have improved diseases resistance and agronomic/quality traits that contribute substantially to the economic development of the state and income of wheat growers and industry while meeting the export market requirements. After seven years of dominance, the HRSW cultivar Glenn was overtaken by the new NDSU cultivar Barlow, adapted to eastern and central ND, grown on 17.0 percent of the acreage. Barlow combines excellent yield potential with disease and quality traits desired by farmers and industry. The NDAES released

Prosper, a high yielding, disease resistant cultivar for eastern ND, Velva, a high yielding, disease resistant, and high quality cultivar for central North Dakota, and Elgin, a HRS wheat cultivar that shows excellent yield potential in western ND, combined with excellent quality traits. Released Jury, an oat variety well adapted throughout eastern and central ND. This cultivar possesses high yield with excellent quality traits, and is high in beta-glucans, shown to lower serum cholesterol in humans. These traits, coupled with its excellent disease resistance, will ensure this cultivar's success. Released the durum cultivar Carpio. This cultivar is ideally suited to central and western ND. It has excellent quality characteristics, superb agronomic traits, and very good resistance to a number of diseases that plague durum production in North Dakota. This line, because of its excellent quality, should compete well with other recently released NDSU durum cultivars, Divide, Tioga, Alkabo, and Grenora. Released the red bean Rio Rojo. Rio Rojo is a high yielding, disease resistant small red bean that meets both the export needs for this commodity, as well as the national dry pack industry in the country.

2. Developed, maintained, and improved disease forecasting systems that are important tools for managing important diseases on several crops such as wheat, barley, sugarbeet, potato, and canola.
3. Reduced leafy spurge infestation from its peak of 1.5 million acres to 600,000 acres by 2011, the lowest amount since 1971. Prior to the initiation of this long-term research and control effort, leafy spurge was doubling in acreage in the state every ten years. This has provided an estimated $14 million in additional revenue due to increased grazing and recreational land use and reduced herbicide expenditures of nearly $1 million annually.
4. North Dakota is the regional leader in early detection and rapid response to invasive weeds. While new weeds are constantly entering the state, they have not become widely established. The collaborative efforts of NDAES scientists, with other state and Federal agencies has kept new invasive species, such as saltcedar and yellow starthistle, from establishing in the state, as they have done in neighboring states.
5. Nutrient intake by the pregnant female has been shown to influence progeny performance via epigenetic modification of gametes and early embryo and/or alterations in nutrient partitioning due to augmentation of placental function. This important area of research has implications for livestock producers in ND and may lead to breakthroughs in targeted supplementation programs that deliver specific nutrients at specific times during gestation.
6. Research is underway to understanding pain and analgesia in dairy cows – a major step toward obtaining FDA approval for a drug to treat pain in food animals.
7. NDAES animal scientists continue to work to reduce the cost of feeding cattle. The new Beef Cattle Research Complex has been utilized to conduct multiple research projects involving impacts of feed efficiency. Results suggest that body composition, visceral tissue mass, pancreatic enzymes, and cellular metabolism are influenced by diet and may be differentially associated with differences in feed efficiency. Research to increase feed efficiency, either through improved feeds or improved genetics, or both, has shown that an increase in only 10.0 percent feed efficiency will generate over $40 million annually to the state's livestock industry.
8. The Veterinary Diagnostic Lab (VDL) carries out critical research on the cause of disease affecting livestock in the state. Scientists at the VDL carry out research from more than a thousand samples submitted to the lab and they work closely with other state and federal agencies to identify and monitor infectious diseases, such as foot and mouth disease, which can be devastating to the state's livestock producers. This is a critical, but often overlooked component of the livestock industry in the state. The VDL has developed in-house assays that target the detection of petroleum byproducts in rumen contents. The VDL also has developed livestock water quality assays targeting possible water contamination by oilfield activity.

9. NDAES established the nation's first Pulse Quality Lab that works with the breeding program and with the industry to evaluate the level of quality of the ND pulse crop.
10. Plant diseases costs the North Dakota economy hundreds of millions of dollars annually in lower yields, reduced crop quality, and increased input costs to mitigate diseases development. Plant pathologists at the NDAES carry out research to understand the causes of disease development and to improve the diagnosis and management of them. Host genetic resistance is the most economical and environmentally-safe way to control disease. NDAES scientists work to identify new and better sources of genetic resistance to diseases that threaten crops grown in North Dakota. Efforts are underway to determine the area of infestation of soybean cyst nematode in ND. This pathogen has now been confirmed in 12 soybean-producing counties in ND. Two new sources of resistance to Fusarium head blight were identified in wheat. Genetic resistance to the new stem rust race Ug99 has been mapped in wheat and used as source material in the breeding program. A new pathogen that causes phomopsis in sunflower was identified in ND and the US, which can cause substantial damage to the state's sunflower crop. Potato mop top virus, a new soilborne tuber necrosis virus of potato, has been identified in ND and two biotypes of the invasive zebra chip bacterium also were identified. Molecular markers were developed to detect and differentiate the biotypes in the insect vector, the potato psyllid.
11. NDAES scientists have investigated the feasibility of using CRP biomass for ethanol production while preserving and enhancing the production, diversity, and stability of CRP.
12. Subsurface drainage concerns have raised interest in controlled drainage and subsurface irrigation to preserve soil nutrients and increase crop yields. NDAES scientists are studying runoff, evapotranspiration, soil moisture, and other parameters to enhance knowledge for profitable crop production while reducing the risk of water availability.
13. The health effects of certain North Dakota products are being explored. Durum breeding efforts to reduce cadmium have been successful. This naturally-occurring element, when found at high levels in the seed, affects the North Dakota durum grower from competing effectively in certain export markets with other durum growing regions in the world. Developing dry bean cultivars with high levels of zinc and iron will enhance the quality of these products in export markets. The consumption of appropriate levels of zinc by women of child-bearing age eliminates the risk of a child born with spinal bifida. A high level of iron in the diet enhances mental acuity and overall health. Certain legumes possess high levels of antioxidant activities which is important in cancer prevention. Canola oil, because of its very high levels of omega-3 oils, has been given a heart-healthy label. Soluble fiber concentration in oat food products can provide health benefits to humans. In addition to reducing serum cholesterol, thereby reducing the risk of heart attacks, oat soluble fiber also can reduce the risk of certain cancers, particularly colon cancer.

2011 ANNUAL HIGHLIGHTS

North Dakota Agricultural Experiment Station
NDSU Extension Service

NDSU NORTH DAKOTA STATE UNIVERSITY

This publication was produced by NDSU Agriculture Communication. Writers: Richard Mattern and Ellen Crawford. Graphic Designer: Deb Tanner

Photography: NDSU, NDSU Agriculture and University Extension faculty and staff, FEMA, and Montana State University

Welcome to NDSU Agriculture and University Extension

Ken Grafton

Duane Hauck

Welcome to the 2011 Annual Highlights! 2011 was a trying time for much of North Dakota—a hard winter, followed by floods in many major areas of the state. On the farming and ranching side, many experienced a difficult growing season, with too much rainfall and overall wet conditions, resulting in record preventive planting acres. Yields of most commodities were affected by the poor growing season. So, it's good to have 2011 behind us and look forward to 2012!

Despite the poor year, our research and Extension activities continued with great success. This year's highlights describe a few of the many research and Extension activities that occurred last year.

First and foremost, the Extension Service worked diligently throughout the state to help people affected by flooding, not only in the Red River Valley, but the Bismarck-Mandan area, Minot, Valley City, Jamestown and other areas. Without their efforts, the financial and psychological impacts of flooding would have been worse.

Thanks to legislative support, we have secured funding to complete the Main Station greenhouse. The final phase of this state-of-the-art facility will be completed by spring, 2013 and will provide our plant-based scientists a research platform that is without parallel in North America. Also, our Beef Cattle Research Complex, also a state-of-the-art facility, with only three like it in North America, has allowed for superb research to be carried out on genetics, nutrition, reproduction and physiology, feed efficiency and meat quality in beef cattle. Finally, our soil health initiative will focus our research and Extension activities to address soil salinity, management, fertility, tillage, drainage and other factors that affect one of our most precious resources.

The Morrill Act , also known as the Land Grant Act, was signed into law by President Abraham Lincoln in 1862. Consequently, 2012 marks the 150th anniversary of this milestone legislation, which not only helped make higher education available to everyone, but it also led to the creation of an Ag Research and Extension system that is the envy of the world.

Finally, as you all know, Duane Hauck retired from the Extension Service on Dec. 30, 2011, after more than 35 years of service, most recently as director of Extension. Duane did a marvelous job in that role, helping Extension achieve greater levels of funding from numerous sources and addressing the needs of our great state. Chris Boerboom, assistant director, agreed to take on the director's duties on an interim basis and I know Chris will do an excellent job. We are in the final stages of a search to replace Duane, and he will be difficult to replace.

NDSU Extension
Aids Flood Victims

Courtesy Patsy Lynch, FEMA

Flooding in 2011 once again put the NDSU Extension Service at the forefront of the state's disaster preparation and recovery efforts.

"Our initial efforts were to provide resources related to proper sandbagging, dike construction, evacuation preparedness, sump pumps, floor drains, children, stress and emotional health to all the sandbagging sites," says Burleigh County Extension agent Megan Myrdal. "As individuals were waiting in line for sandbags, Extension staff, volunteers and National Guard men and women walked through the lines and delivered material to people, allowing them to use this downtime to read, plan and prepare."

Agents used numerous methods to reach people. They provided handouts and other educational materials at flood information meetings; set up displays with resources at county Extension offices, disaster recovery centers, local businesses and other places people gather; fielded calls for assistance and lent a sympathetic ear to those who needed to vent their frustrations; submitted news releases and public service announcements to the news media and gave numerous interviews; and organized educational sessions on flood cleanup, dealing with stress and financial recovery after a disaster.

New technology was a vital link in reaching people. Agents posted information on Facebook. Extension added an Ask an Expert feature to NDSU's flood website to allow people to ask questions about flood-related issues day or night. Extension specialists created flood cleanup videos, which were posted on the website, and collaborated with counterparts at the University of Minnesota Extension to develop a free online resource called Recovery After Disaster: The Family Financial Toolkit.

Extension also helped create Disaster Recovery Log, a smartphone application that lets users record information about damages in their flooded homes using text, images and audio, as well as access NDSU flood recovery information.

Extension agents located hay and feed supplies for producers, helped ranchers relocate cattle, worked with state agencies to allow producers to receive unemployment benefits, answered flood help lines, copied materials for city and county emergency management personnel, helped coordinate flood cleanup volunteers, and helped find temporary shelter for pets. In Minot, the Souris Valley Animal Shelter set up an emergency pet shelter at NDSU's North Central Research Extension Center.

Agents also helped flood victims regain a sense of normalcy.

"In an effort to give the kids a chance to participate in a few of their normal summer activities, the 4-H Achievement Days events were rescheduled," Ward County Extension agent Gail Slinde says. "Although participation was down, the kids who really wanted to exhibit were given the chance."

After the flooding, NDSU Extension flood expert Ken Hellevang held town hall sessions in Minot, Bismarck and Mohall for residents to ask questions about cleanup issues. In Minot alone, a total of about 1,200 people attended two sessions. Hellevang also conducted workshops for Minot and Bismarck-Mandan area contractors on restoring flood-damaged structures. County Extension offices provided moisture meters for people to test whether the structural materials in their homes are dry before starting to rebuild.

NDSU Extension's flood preparation and recovery expertise is attracting national attention. The Red Cross and Federal Emergency Management Agency distribute Extension's material to flood victims, and Hellevang provides advice to Extension specialists and agents in other states.

For more information: Ken Hellevang, (701) 231-7243, www.ag.ndsu.edu/flood

Courtesy David Valdez, FEMA


Courtesy David Valdez, FEMA

“This facility is a positive story that’s going to affect the future of our beef cattle sector and North Dakota’s economy for a long time to come.”

North Dakota beef producer

New Facility Enhances Beef Research

NDSU's state-of-the art Beef Cattle Research Complex will help meet the challenges of 21st century beef cattle production.

"This is a great facility that will enhance our research efforts on management, reproduction, nutrition and physiology of beef cattle," says Ken Grafton, vice president for Agriculture and University Extension, director of the North Dakota Agricultural Experiment Station and dean of NDSU's College of Agriculture, Food Systems, and Natural Resources.

The complex, dedicated in summer 2011, can accommodate up to 192 cattle. It consists of a feeding area, cattle handling system, calving pens, an office and laboratory area, and a facility for mixing and storing feed.

Only three other research facilities in North America have the same specialized feeding equipment. Researchers will be able to measure and control feed intake for cattle individually and provide a variety of diets for cattle in the same pen.

The feed facility will allow researchers to mix, store and feed cattle ingredients, including hays, grains, silages, wet and dry byproducts, and dry and liquid supplements. Researchers will be able to use ultrasonography to determine pregnancy or carcass quality and collect tissue samples in the handling facility. The handling system also can process and weigh all classes of cattle.

Nutrition and reproductive physiology research in growing cattle and pregnant and lactating beef cows will be among the first projects at the complex.

The complex was constructed using a combination of state and federal dollars totaling more than $3 million.

For more information: Trent Gilbery,
(701) 356-3284, trent.gilbery@ndsu.edu

Research Targets

Soybean Aphids, Wheat Stem Sawflies

Research is being conducted on methods to control yield-robbing soybean aphids and wheat stem sawflies.

Multiple strategies are being developed for managing both insect pests.

Researchers are looking at resistant varieties, models to predict when pest outbreaks might occur and natural management; developing economic thresholds for proper timing of insecticides; and conducting insecticide efficacy screening with different chemical companies.

North Dakota wheat growers lost an estimated $70 million in 2009 alone due to wheat stem sawfly, and the need for viable pest management strategies continues. Soybean aphids invaded in 2001 and have become the primary soybean insect pest in North Dakota.

There were only occasional insect pest issues in soybeans grown in North Dakota prior to soybean aphids, which resulted in less than 0.1 percent of soybean fields being treated with insecticides. Due to the damage potential of more than a 40 percent yield loss from soybean aphids, insecticide applications have increased 130-fold, and soybean production costs have risen by $10 to 20 per acre.

For more Information: Janet Knodel, (701) 231-7581, janet.knodel@ndsu.edu

Courtesy RKD Peterson, Montana State University

Wind Lessons Make
Big Impression

Bottineau County elementary school students have discovered a simple saltine cracker can teach them about wind energy.

These youngsters were among about 4,100 North Dakota students who joined millions of youth nationwide on Oct. 5 for "Wired for Wind," the 4-H National Youth Science Day's 2011 experiment.

After discussing types of energy and studying photos of wind farms and wind turbines, the Bottineau County kindergarteners and first-, second- and third-graders made their own turbines. They balanced crackers on their fingers and gently blew on the crackers to make them spin. Then the students made pinwheels and went outside to see the wind in action.

"It was a really windy day, and the kids squealed with delight as their pinwheels came to life," says Bottineau County Extension agent Karla Monson.

4-H launched National Youth Science Day in 2008 as part of a massive effort to help build American's future workforce in science, engineering and technology.

In Morton County, fourth- and fifth-graders designed and built wind turbines as their Wired for Wind project. They chose vertical or horizontal blades and decided which blade pitch would produce the most energy.

"The kids strategized as to what turbine style they would make and watched as others put together their wind turbines so they would have a better reading of voltage," says Morton County Extension agent Karla Meikle.

The students also learned how tall commercial wind turbines are, how much they weigh and how much concrete goes into building them, as well as about the challenges of building wind farms, the best locations for wind farms in North Dakota, impacts of wind farms on bird migration, and power transmission.

"They thought it was pretty cool how power generated in North Dakota could be transmitted and used all the way to Duluth, Minn.," Meikle says.

For more information: Linda Hauge, (701) 231-7964, linda.hauge@nsu.edu, www.4-H.org/nysd

Programs **Empower** Neediest Families

Despite North Dakota's low unemployment rate and budget surplus, one in 11 people needs food assistance, and rising food prices are straining families' budgets.

The NDSU Extension Service helps the neediest North Dakotans use their limited food dollars in the most healthful ways through two federally funded programs: the Family Nutrition Program (FNP) and the Expanded Food and Nutrition Education Program (EFNEP). Annually, they provide direct education to more than 5,700 low-resource adults and 17,700 children by:

- Showing participants how to plan and prepare healthful meals on a budget
- Helping families eligible for or receiving Supplemental Nutrition Assistance Program benefits optimize their food assistance
- Teaching families practical nutrition, and food preparation and safety skills

FNP and EFNEP educators collaborate with partners including public health and social services agencies, schools, tribal offices, senior sites and grocery stores to leverage services and offer strong outreach. The educators provide outreach in 31 counties. That includes the state's four reservations.

A multistate analysis including North Dakota estimates that every $1 spent on EFNEP reduces limited-resource families' health care by $8.82.

Following a series of EFNEP lessons for adults in 2010-11:

- 86 percent showed improvement in one or more nutrition practices, such as using less salt and reading nutrition labels
- 79 percent showed improvement in food resource management such as planning meals and comparing prices
- 64 percent showed improvement in one or more food safety practices, such as thawing meat properly

After participating in FNP nutrition education programming:

- 85 percent of youth reported being active four or more days a week
- 75 percent of youth reported eating more vegetables
- 56 percent of seniors reported being more physically active
- 55 percent of seniors reported eating more fruits and vegetables

For more information: Megan Ness, (701) 231-6515, megan.l.ness@ndsu.edu, www.ag.ndsu.edu/foodwise

Researchers Study Disease-causing Bacteria

You can't see them, but bacteria can cause serious health problems in humans and on the surfaces of medical devices and food processing equipment.

The bacteria may show up as plaque on teeth or cause otitis (a middle-ear infection) or cystic fibrosis, a disease causing thick, sticky mucus to build up in the lungs. The bacteria also can lead to a sometimes deadly foodborne illness.

Researchers in NDSU's Veterinary and Microbiological Sciences Department are trying to find ways to combat these collections of bacteria, called bacterial biofilms.

"The information that will be obtained from the research in my lab will constitute a major breakthrough in our understanding of the physiology that underlies biofilm formation and will have implications in several biofilm-associated problems and/or applications," assistant professor Birgit Pruess says.

One possible application is the development of novel drugs to treat biofilm-associated infectious diseases.

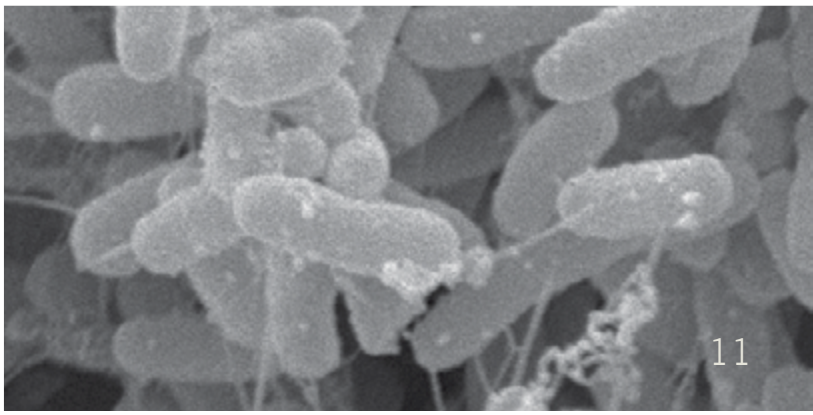
"As a general rule, disrupting the communication pathways that lead to processes like biofilm formation is a promising alternative to traditional drug therapies that reduce bacterial growth while inducing resistance," Pruess says.

She also is trying to determine what conditions cause bacterial biofilms to form. Pruess, in collaboration with Anne Denton, an associate professor in NDSU's Department of Computer Sciences, found that nutrients available to the bacteria are instrumental in determining the amount of biofilm formed. The researchers will pinpoint single nutrients to inhibit biofilm formation, which will aid in developing biofilm prevention and treatment techniques.

While studying a pathogenic *E. coli* strain grown on meat surfaces, Pruess and Ph.D. student Preeti Sule found that eliminating flagella, the hairlike structures that help bacteria move, increased the bacteria's biofilm-forming ability, cell division rate and pathogenicity, or ability to produce an infectious disease in an organism.

"These findings open countless avenues to the development of novel meat treatments that would simultaneously reduce the cell number, the ability to form biofilm and pathogenicity," Pruess says.

For more information: Birgit Pruess, (701) 231-7848, birgit.pruess@ndsu.edu



“The Rural Leadership North Dakota program not only made me a stronger advocate for North Dakota; it made me want to become proactive in its future.”

2009-2011 RLND program participant

Pool of Potential N.D. Leaders **Expands**

Sixteen more North Dakotans are ready to overcome the challenges rural North Dakota faces and guide the state into the future.

They are the latest graduates of Rural Leadership North Dakota, the NDSU Extension Service's leadership development program.

During the 18-month course, participants develop leadership skills while learning about agricultural and rural economics and policies, and how to help their organization, business, farm or ranch operation, or community grow and prosper. They attend in-state seminars, tour agricultural and community businesses, and take national and international trips to learn about agricultural and community issues in the U.S. and abroad.

"I feel more confident in my role as a community leader," says 2009-11 program participant April Haring, city auditor and community development director in Oakes. "There are many people who don't feel like they have the ability to be a strong leader or community advocate. This program will help them realize that they can go beyond their comfort zone and be amazed at what they can offer."

Many communities have benefited from projects RLND participants initiated as a part of their RLND course. For example, Bowman County and the surrounding area now have year-round weather radar coverage, volunteers changed batteries in smoke detectors for elderly Bismarck residents, and Devils Lake gained an industrial park that gives businesses a place to expand and tap into less expensive forms of transportation.

Seventy-one people from 48 communities in 32 counties have participated in RLND since it began in November 2003.

"It has shown me new ways to look at myself, others in the community, and how interactions between community groups and leaders work and how they could be improved," says Golden Valley County Extension agent Ashley Ueckert, also a 2009-11 class member.

For more information: Marie Hvidsten, (701) 231-5640, marie.hvidsten@ndsu.edu, www.ag.ndsu.edu/rlnd

NDSU, Tribes Work Together on
Gardening Projects

NDSU Extension collaborated with tribal colleges and reservations across North Dakota in summer 2011 to grow and learn about community gardens and complete various food projects.

In Bismarck, the United Tribes Technical College, along with Tom Kalb, NDSU Extension horticulture specialist, planted a dragonfly garden, which is a multiphase research and demonstration garden. Pat Aune's team at UTTC also grew youth garden projects with Peggy Candler, Burleigh County Extension agent. A vegetable garden of the sort traditionally grown by Native Americans at the Turtle Mountain Reservation also was planted at UTTC.

Linda Different Cloud, Sitting Bull College in Fort Yates, maintained a native plant foods walk. Sue Isbell, Sioux County Extension agent, organized a community garden and soup kitchen in Fort Yates.

Carol Enno, Fort Berthold Extension agent, helped develop traditional Mandan/Hidatsa/Arikara gardens near New Town. Both Enno and fellow agent Elise Regen helped youth grow and harvest a garden at the Fort Berthold Community College land lab and community garden that is managed by FBCC's Mary Fredericks and Adam Guy. UTTC and NDSU sponsored a tour of all these projects for Extension professionals from all the collaborating institutions.

Meanwhile, the Grandmother Earth's Gift of Life Garden on the NDSU campus has signs to identify the various plants in the garden and their possible uses.

The garden is at the corner of Centennial Boulevard and Administration Avenue and honors Native Americans of North Dakota. It features plants and soil provided by tribal colleges throughout the state.

Todd Weinmann, NDSU Extension horticulturist for Cass County, formed a committee to look at what should be planted in the garden and how the public could fully appreciate the garden through educational efforts, such as the identification signs. Botanists from the tribal colleges shared information on how native Americans used the plants.

The NDSU Extension Service, along with the Spirit Lake Tribe, Standing Rock Sioux Tribe, Turtle Mountain Band of Chippewa, Mandan Hidatsa Arikara Nation, Sisseton Wahpeton Oyate and NDSU Office of Multicultural Programs, planned and implemented the garden.

For more information: Todd Weinmann,
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Frank Kutka, (701) 483-2348, frank.kutka@ndsu.edu

Research Advancing Forage Production

Most legume forage species don't appear to be able to compete with weeds without help from herbicides, especially in the crops' establishment stage.

That's one of the preliminary findings of a long-term legume forage study NDSU's Central Grasslands Research Extension Center near Streeter began in 2010.

Researchers are evaluating 42 legume species/varieties, including five varieties of alfalfa, several vetches and clovers, field peas, cow peas, mung beans, five varieties of birdsfoot trefoil, forage peas, lentils and sunn hemp. Their objectives:

- Build a database of forage legume species/varieties with information such as their form and structure, life cycle, nutritional needs and productivity in this region
- Determine soil health, including organic matter, nitrogen, infiltration and aggregate stability, under different legume species/varieties

"In the first year of this study, we wanted to test the ability of legume species to compete with common weeds in our region, so no herbicide was applied," says center forage agronomist Guojie Wang. "The field observation showed that only one species, field pea, could suppress the weeds. The rest of the tested species/varieties had severe problems with weeds."

The researchers elected to focus on forage legumes because they are important to producers. In North Dakota, for instance, more than half of the hayland is planted to alfalfa alone or in combination with other species. However, alfalfa may not be the best option for every purpose.

"This screening and evaluation process is dynamic, and we will keep screening the new species/varieties and replace the ones that cannot fit our region's soil and climate until we are able to make some recommendations on the best species for our area," Wang says.

For more information: Guojie Wang,
(701) 424-3606, guojie.wang@ndsu.edu
www.ag.ndsu.edu/CentralGrasslandsREC/forage-research

Fruit Evaluation Produces Tasty Results

The next time you enjoy products made with North Dakota-grown fruit, you may want to thank NDSU's Carrington Research Extension Center.

That's the home of the Northern Hardy Fruit Evaluation Project, a three-acre orchard where researchers evaluate 15 kinds of fruit for adaptability to North Dakota's growing conditions, productivity, disease resistance, quality and suitability for making products such as jams and wine.

The project's two main goals are:

- Introduce growers, processors and consumers to fruits that can be grown easily in North Dakota
- Provide home gardeners and new or existing agribusinesses with information they need to grow these fruits successfully

Fruits being evaluated include aronia; tree and dwarf sour cherries; haskaps; red, white and black currants; grapes; gooseberries; and plums.

Project manager Kathy Wiederholt shares results with gardeners and commercial enterprises through field tours with presentations from fruit production experts, and presentations to groups and at events. In 2011 alone, she spoke to nearly 370 people at meetings and 125 on field tours, and provided about another 80 people with information by phone or email.

Using information from the project, a winery in east-central North Dakota planted 500 to 1,000 aronia and haskaps, and a Benson County producer planted 850 aronia plants on the family farm about three years ago. Both have added plants each year since then. In addition, a southeastern North Dakota entrepreneur wanting to produce wine started a fruit orchard using native fruit plants and fruits identified as hardy in NDSU's evaluation trials.

Researchers also distribute the fruit to food processors and hobby and commercial winemakers in the state.

For more information: Kathy Wiederholt, (701) 652-2951, kathy.wiederholt@ndsu.edu, www.ag.ndsu.edu/CarringtonREC/

Extension's Educational Material Goes Global

Becoming immersed in a new culture and living conditions can be difficult.

To ease that transition, the NDSU Extension Service has developed resources in a number of languages to help new Americans deal with one aspect of their new lives: how to handle unfamiliar foods safely.

"As North Dakota communities grow in ethnic diversity, we have seen a need to develop resources and training for new Americans," says Julie Garden-Robinson, NDSU Extension food and nutrition specialist.

Extension's food safety materials include videos on food safety in the home in Arabic, Bosnian, Kurdish and Somali, and flipbooks with tips on keeping food safe in Arabic, Bosnian, Kurdish, Nepali, Somali and Spanish. Some ways the material has been used are:

- Flipbooks were used in workshops for health mentors from Bhutan, Sudan, Somalia, Iran, Iraq, Bugundi and Rowanda to help them educate others about food safety.
- Extension agents from Grand Forks County worked with Nepalese refugees on a gardening project to grow vegetables and edible grasses.
- Nepalese cooks took food preservation and safety classes in Grand Forks County.

NDSU Extension also is responding to producers in other countries who want to know more about the U.S. beef industry by translating some material into other languages. For example, BeefTalk, NDSU Extension beef cattle specialist Kris Ringwall's weekly column, is available in Spanish.

"I would like to translate into Portuguese as well," says Ringwall, who also is director of NDSU's Dickinson Research Extension Center.

For more information: Julie Garden-Robinson, (701) 231-7187, julie.garden-robinson@ndsu.edu
Kris Ringwall, (701) 483-2348, kris.ringwall@ndsu.edu
www.ag.ndsu.edu/globalfood/
www.beeftalk.com/

“Pioneering research work
at NDSU has made and will continue
to make substantial contributions
to the advancement of soil and
environmental sciences.”

Researcher at the Institute of Arctic Biology,
University of Alaska

NDSU Finding Ways to Improve **Soil Health**

The North Dakota Agricultural Experiment Station and NDSU Extension Service are moving forward on an initiative that focuses on alleviating soil-related problems.

"The initiative includes salinity and sodicity problems and fertility management, as well as addressing ways for landowners to manage their land resources for agricultural, recreational and wildlife needs," says Ken Grafton, Agriculture and University Extension vice president, Agricultural Experiment Station director and College of Agriculture, Food Systems, and Natural Resources dean.

Saline and sodic soils (accumulated sodium) affect approximately 12.6 million acres of agricultural land in North Dakota.

As part of the solution, several NDSU Extension specialists and staff have established a tile drainage research site. Tile drainage will lower the water table so water can move downward through the profile to lower the salt level at the root zone. Hans Kandel, NDSU Extension agronomist, is leading the Extension team and collaborating with Extension specialists Tom Scherer, water quality and irrigation specialist; Joel Ransom, agronomist for cereal crops; Sam Markell and Marcia McMullen, plant pathologists; and Dave Franzen, soil science specialist.

Other research scientists are looking at other soil health issues. Tom DeSutter, NDSU environmental soil scientist and professor in the Soil Science Department, is doing research on the quality of sediment after a flood, different methods of evaluating soil salinity in fields and possible byproducts that could be used as fertilizers.

There are other long-term threats to soil health.

"North Dakota exports the fertility of its soil whenever a bushel of grain is hauled away," says R. Jay Goos, NDSU Soil Science Department professor. "Replacing that fertility likely will be very expensive in the future. Soil fertility is a large component of soil quality. I think that soil quality issues will be with us for a long time."

For more information: Ken Grafton,
(701) 231-7655, NDSU.Exp-Dir@ndsu.edu
R. Jay Goos, (701) 231-8581, rjgoos@ndsu.edu

NDSU Seeks Brine Spill Contamination

Solutions

Loss of agriculturally productive land to damage from brine spills in the oil-producing areas of western North Dakota has been a problem since the 1950s. Brines (water with large amounts of dissolved salts) typically are produced as a byproduct of crude oil extraction.

Looking to change that is Lyle Prunty, NDSU Department of Soil Science professor. Through a grant from the Gordon A. Larson Agricultural Research Fund, Prunty is identifying brine-impacted sites, evaluating them and demonstrating potential reclamation possibilities. So far, this work has been primarily in western Bottineau County.

"This problem has received little attention during the past 50 years by agricultural researchers, possibly because the affected areas, although numerous, are widely scattered and the damaged areas are small," Prunty says.

Prunty also will sample and evaluate saline soil problems not associated with oil well brines but nevertheless useful for addressing brine spill problems. Areas of excess soil salinity are scattered throughout North Dakota.

Prunty will be preparing site-specific protocols for reclaiming the land based on soil sample analysis.

For more information: Lyle Prunty, (701)-231-8580, lyle.prunty@ndsu.edu

NDSU Spreads the Word About

Nutrient Management

North Dakota livestock and poultry facilities generate huge quantities of manure, which can create odor and dust problems and pose accumulation, storage and disposal challenges.

The NDSU Extension Service has developed a multifaceted approach to help producers manage animal waste and turn it into an effective crop fertilizer. This effort includes publications, presentations, workshops, composting demonstrations, newsletters, a nutrient management website with information and links to other sites, a manure nutrient sampling program and the North Dakota Discovery Farms project. That project monitors water quality adjacent to animal feeding operations and allows producers to make management decisions for their operation based on collected data.

Twenty-seven producers and 36 technical service providers or educators have attended compost demonstrations. Nearly 90 percent of the producers surveyed after attending a demonstration said they would or likely would compost. Three county soil conservation districts have bought compost turners and offer compost turning as a service or rent the turner to producers. Also, NDSU Extension and soil conservation districts collaborate on many educational programs.

Researchers and farmers from North Dakota, Minnesota, Wisconsin and Arkansas visited North Dakota's three Discovery Farms during a July 2011 tour.

"Visiting North Dakota Discovery Farms was a great opportunity to see how monitoring programs operate in different states," says Dennis Busch, research manager of the University of Wisconsin-Platteville Pioneer Farm.

Chris Augustin, nutrient management specialist at NDSU's Carrington Research Extension Center, helped test 75 manure samples for nutrients at no cost to producers. This helps producers know how much manure to apply on their fields. A publication the researchers are creating about the nutrients found in North Dakota manures also will help producers.

For more information: Chris Augustin, (701) 652-2951, chris.augustin@ndsu.edu, www.ndsu.edu/nm

Research Extension Centers Address

Ag Needs

Despite flooding in many parts of the state, more than 4,000 people visited NDSU's Research Extension Centers for field days, tours, demonstrations, workshops, presentations, clinics and other events in 2011.

These activities gave researchers and Extension faculty an opportunity to showcase crop and livestock research at the centers as well as share information on topics such as:

- Subsurface drainage
- Forage management
- Weed, pest and disease control
- Soil quality
- Combine calibration
- Prevented planting
- Grazing
- Pulse crops
- Nutrient management
- Beef industry potential
- Backgrounding

During field days, Extension water quality experts provided free basic water quality screening on 58 water samples people brought for testing. Twenty-eight people purchased a bacterial testing kit with a sterile bottle for collecting a water sample to send to a laboratory for more in-depth testing.

The water quality experts also answered visitors' questions about their wells, water supplies for their livestock, testing water for contaminants and how to read test results.

For more information: Ken Grafton, (701) 231-7655, NDSU.Exp-Dir@ndsu.edu, www.ag.ndsu.edu/research/recenthp.htm

Chinese May Use
N.D. Malting Barley

Will the Chinese soon be drinking beer made out of North Dakota barley? North Dakota barley producers and organizations hope so, and so does Paul Schwarz, NDSU Institute of Barley and Malt Science director.

China ranks as the top beer-producing nation in terms of gallons.

To introduce Chinese maltsters and brewers to six-rowed malting barley, a group of experts from NDSU and industry and barley producer organizations traveled to China to present information at workshops on malting processes. Held in Beijing and Shanghai, the presentations included technical considerations and malting performance of U.S. six-rowed varieties, industry experiences with U.S. six-rowed barley and information on U.S. barley production practices. The group also toured the Tsingtao Brewery in Qingdao and research facilities at Jiangnan University in Wuxi.

A similar group previously spent time with Chinese brewers who requested more technical information on U.S. malting processes. After that trip, barley samples from Minnesota and North Dakota were sent to China for microbrewing trials.

For more information: Paul Schwarz, (701) 231-7732, paul.schwarz@ndsu.edu

Spillin' the Beans About Beans

Dry edible beans, an abundant crop in North Dakota, may help reduce childhood obesity, a growing problem nationwide.

To educate parents about the health benefits of dry edible beans and increase children's knowledge of gardening, and beans in particular, the NDSU Extension Service developed Spillin' the Beans About Beans. It's a four-lesson curriculum.

Forty-seven families with children enrolled in NDSU's Child Development Center and the University of North Dakota's University Children's Center participated in the program launched in the spring of 2011.

The preschoolers sprouted beans in gardens sponsored by Extension's Junior Master Gardener program, participated in art projects and heard stories about beans. The children and their parents tasted and rated 10 recipes containing beans. Parents received a weekly newsletter with information on the health benefits of beans, activities to do with their children and bean preparation, plus recipes of the sampled dishes.

"Gardening and other hands-on activities have been shown to be excellent methods to promote changes in children's diets, especially as a means of improving vegetable consumption," says Julie Garden-Robinson, NDSU Extension food and nutrition specialist.

After the program ended, parents and children continued gardening activities, such as weeding and tasting the garden's bounty. Other program results included:

- Parents increased their awareness of beans as a source of fiber and folate, and the link between beans and blood sugar management in diabetics.
- Families significantly increased their use of canned beans.
- Tested bean recipes became part of the menus at both child-care facilities.

This program is part of the Common Bean Coordinated Agricultural Project, a multistate effort involving bean breeders and other researchers at several universities, including NDSU, and U.S. Department of Agriculture centers.

For more information: Julie Garden-Robinson, (701) 231-7187, julie.garden-robinson@ndsu.edu

Online Course Helps
Reduce Energy Use

Homeowners hoping to cut their energy bills are getting some help from the NDSU Extension Service.

Home energy video clips that Extension posted on YouTube in summer 2011 have had nearly 1,700 views.

The clips, each focusing on a different aspect of home energy use, are part of Extension's Home Energy 101, a free online course. The course, based on NDSU Extension's publication "Top Ten Home Energy Checklist," includes information about energy use, interviews with home energy experts who offer real-life examples of energy wasted in homes, and tips and techniques for reducing energy loss.

"Buildings use 71 percent of the electricity produced and almost 50 percent of all energy consumed in the U.S.," says Extension energy educator Carl Pedersen, who developed Home Energy 101. "With some energy prices continuing to climb, this course is geared to educate homeowners on ways to save some money, as well as energy resources, by making wise energy-related decisions."

Each video clip is about five minutes long. Viewers can watch some or all of the clips. But if they want a certificate showing they completed the course, they must register, view all of the clips and complete a knowledge review. Parts of the course have had more than 1,300 views.

For more information: Carl Pedersen, (701) 231-5833, carl.pedersen@ndsu.edu, www.ndsu.edu/energy

Barley, Distillers Grains **Show Promise**

Barley is a competitively priced grain that could replace high-cost corn as the primary energy source in feedlot rations, NDSU research shows.

"Barley starch and protein ferment rapidly in the rumen," says Carrington Research Extension Center animal scientist Vern Anderson. He has been studying the effects of feeding barley in combination with distillers grains in growing and finishing diets.

"Fast-growing steers will benefit from the addition of distillers grain, which is a source of bypass (rumen undegradable) protein," he adds. "In addition to this ethanol coproduct often being the lowest-cost protein source, it provides added fat, resulting in greater nutrient density, as well as digestible fiber to stabilize the rumen."

In a growing study, weaned steer calves were fed dry rolled barley with increasing levels of dry distillers grains. Anderson found that feed intake was greater with any level of distillers grain included in the diet. That resulted in improved gains averaging 0.32 pound per day more for calves receiving distillers grain than those fed a diet without it. He also found that adding distillers grains didn't affect feed efficiency.

Yearling steers in a finishing study were fed stepped levels of distillers grain with higher barley levels to support finishing gains. Anderson discovered that feed intake increased significantly for steers on 24 and 36 percent distillers grain treatments. Gains improved from 3.68 to 4.34 pounds per day with the 24 percent distillers grain treatments. Distillers grains treatments also resulted in increases in hot carcass weight, dressing percent, fat thickness, marbling score and USDA yield grade.

"These two studies strongly support the need for bypass protein in barley-based diets and demonstrate the value of fat and, potentially, the stabilizing impact of digestible fiber," Anderson says.

For more information: Vern Anderson, (701) 652-2951, vern.anderson@ndsu.edu

“I would love to see the Nurturing America’s Military Families curriculum get used statewide to all variety of audiences.”

Spouse of military member

Program Strengthens Military Families

Military deployment can be frustrating for the service member's family and community.

"Family members sometimes see it as a weakness if they have to ask for help," says Beth Sandeen, the wife of a twice-deployed North Dakota National Guardsman. "The community doesn't know what the needs are of the families."

To bridge that gap, NDSU Extension agents in Richland, Ransom and Cass counties teamed up with Extension's Region V Parenting Resource Center, the North Dakota Department of Human Services' Children and Family Services Division, the Guard's Child and Youth Program, and Beyond Boundaries Therapy Services to sponsor the Nurturing America's Military Families program in Wahpeton in fall 2011.

The free three-part program was for military families, extended family, counselors, the faith community, teachers, community leaders and others who assist military families.

"This curriculum, developed by Dr. Stephen Bavolek, was selected because of its comprehensive content focusing on the entire family's needs during deployment while addressing what we, as community members, can do to support them," says Angela Berge, Cass County Extension agent and Region V parenting resource coordinator.

Participants learned about the uniqueness of military family life, keeping a relationship together, dealing with deployment and separation, helping children cope with deployment, staying connected with the service member during deployment, reuniting after the deployment is over and dealing with post-traumatic stress disorder.

"This class was helpful, I hope, because it allowed those family members to see that they aren't alone, that they will get through this, and that there is help when they need it," says Sandeen, one of the program's presenters and the North Dakota National Guard's youth services program coordinator.

For more information: Angela Berge, (701) 241-5700, angela.berge@ndsu.edu

Researchers Look to Bring
Cold-hardy Grapes to Market

New grape varieties can take more than 20 years to breed and evaluate, and much longer to reach commercial success. A $2.5 million grant will help a team of researchers tackle vineyard, winery, tasting room and tourism obstacles to bring cold-hardy grapes to a wider market.

The focus of the grant is a group of extremely cold-hardy wine grape varieties, new to both growers and consumers, which have spawned new small-winery industries in the upper Midwest and Northeast during the past decade.

The goal is to provide producers with research-based tools and practices to help them grow, vinify and sell high-quality wines to local and regional markets.

The consortium includes Harlene Hatterman-Valenti, high value crop production specialist from NDSU, along with researchers from Cornell University, Iowa State University, Michigan State University, Oklahoma State University, South Dakota State University, the Connecticut Agricultural Experiment Station, and the Universities of Illinois, Massachusetts (Amherst), Minnesota, Nebraska, Vermont and Wisconsin.

Ultimately, they hope the project will help convert startup wineries into sustainably profitable enterprises that can fuel rural economic development.

The grant was funded by the U.S. Department of Agriculture's National Institute of Food and Agriculture Specialty Crop Research Initiative.

For more information: Harlene Hatterman-Valenti, (701) 231-8536, h.hatterman.valenti@ndsu.edu

Extension Easing Farm/Ranch Transition Worries

Like many North Dakota farmers and ranchers, Jim and Pat Boehm want to retire one day and leave their farm to the next generation.

"We're of an age, and we have sons who are old enough to take over," says Pat Boehm, 65. She and her 68-year-old husband farm near Mandan. Yet they don't know how they'll pass the farm to their sons.

They aren't alone. Nearly half of the state's farm and ranch families may not have an adequate transition plan for their business.

To address this lack, NDSU Extension developed the Farm/Ranch Transition and Estate Planning program. It offers information on the importance of family communication in estate planning, the pros and cons of different farm business arrangements, and the economic and tax consequences of asset transfer strategies. Extension faculty, local attorneys, estate planners and accountants plan the program and deliver it at several locations statewide.

"I'd recommend it to anyone who is thinking about getting a family involved and getting ready to retire," David Miller says. Miller and his wife, Sharon, are among the nearly 400 individuals who have completed the program. The Millers are the parents of six children and raise crops and run a seed-cleaning business near Donnybrook.

"The value of farm and ranch transition planning is often overlooked," says Logan County Extension agent Sheldon Gerhardt. "If the right planning is done for an operation, it can save a lot of money and arguing can be avoided."

This program is critical for those taking over the farm or ranch as well as those planning to retire because the younger generation will gain new perspectives, David Miller believes.

"You can talk to your sons, but sometimes they have to hear it from someone else," he says.

For more information: Willie Huot,
(701) 780 8229, willie.huot@ndsu.edu
www.ag.ndsu.edu/anniesproject/farm-ranch-transition-and-estate-planning

Horizons Built Stronger Communities

New businesses, additional housing, increased tourism, and more recreational and educational opportunities are some of the benefits the Horizons program brought to North Dakota's rural communities.

Forty-six rural North Dakota communities participated in Horizons, an 18-month program launched in the state in 2003. The program provided education, coaching and activities to build strong leadership to help communities address challenges such as poverty, economic decline and population loss. It was the result of a partnership between the NDSU Extension Service and St. Paul, Minn.-based Northwest Area Foundation.

"Experience has shown that small communities can thrive if they have a strong leadership system," says Lynette Flage, an Extension district director. "The Horizons program was about the changes a community can make to move from poverty to hope, from population and economic decline to prosperity."

Here are a few of the program's major impacts on North Dakota:

- Communities have acquired more than $2.4 million in grants.
- Three closed rural schools have been converted to businesses, business incubators, lodging facilities or fitness centers.
- Tourism expanded in 13 communities.
- Several communities developed community gardens and farmers markets to provide residents with fresh fruits and vegetables and give growers a place to sell their produce.
- Five more communities are participating in arts and heritage programs.
- New people are running for office and more people are volunteering to do community work.
- Mayors are appointing youth to serve on community committees.
- Communities started welcome programs to engage newcomers quickly.
- A youth council begun in a rural area is sharing its expertise with larger urban areas.
- Communities initiated buy-local campaigns.
- Many communities have gained transportation systems.
- Communities are forming partnerships with agencies, organizations and other communities.

For more information: Lynette Flage
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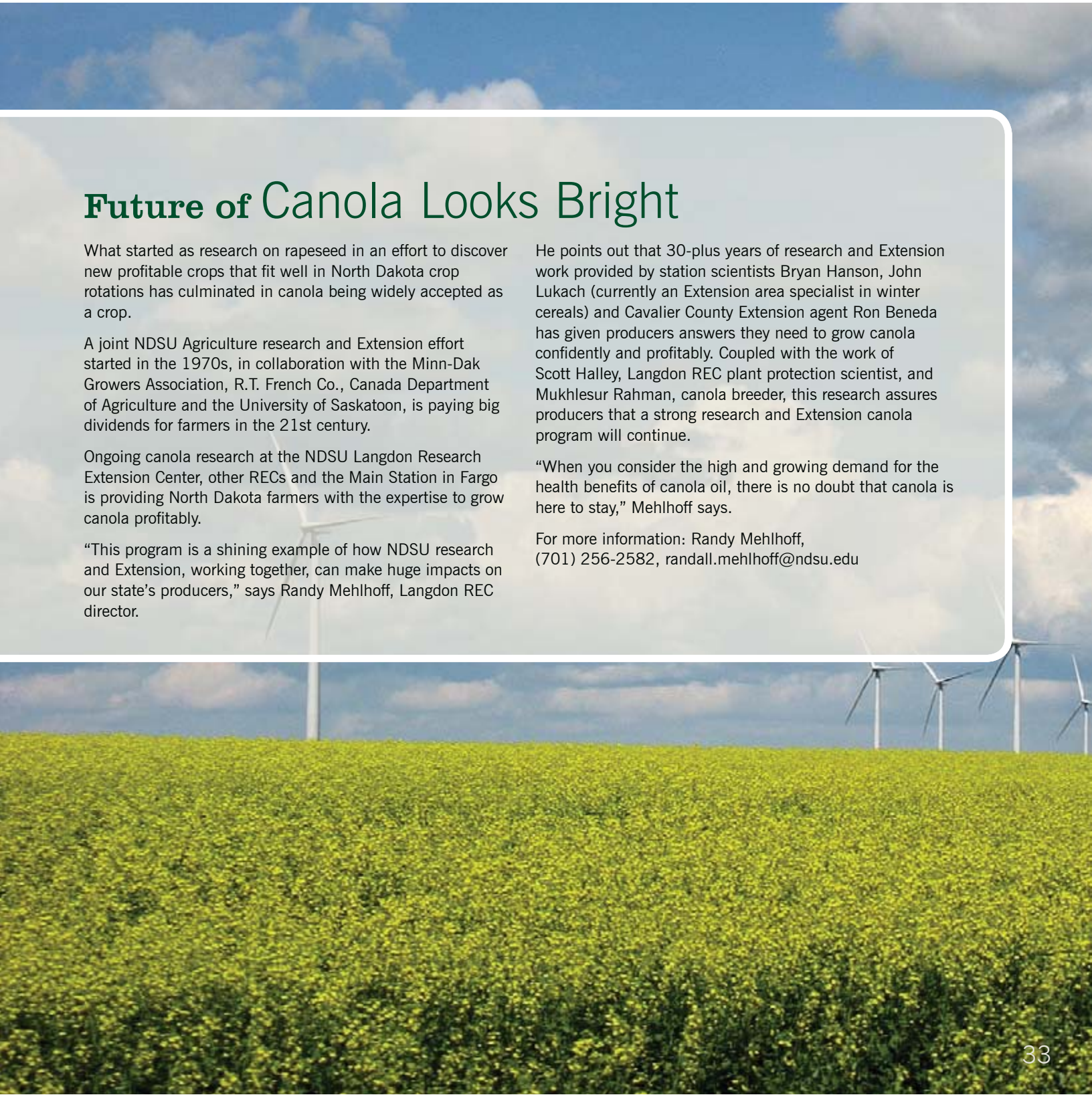
www.ag.ndsu.edu/horizons



Future of Canola Looks Bright

What started as research on rapeseed in an effort to discover new profitable crops that fit well in North Dakota crop rotations has culminated in canola being widely accepted as a crop.

A joint NDSU Agriculture research and Extension effort started in the 1970s, in collaboration with the Minn-Dak Growers Association, R.T. French Co., Canada Department of Agriculture and the University of Saskatoon, is paying big dividends for farmers in the 21st century.

Ongoing canola research at the NDSU Langdon Research Extension Center, other RECs and the Main Station in Fargo is providing North Dakota farmers with the expertise to grow canola profitably.

"This program is a shining example of how NDSU research and Extension, working together, can make huge impacts on our state's producers," says Randy Mehlhoff, Langdon REC director.

He points out that 30-plus years of research and Extension work provided by station scientists Bryan Hanson, John Lukach (currently an Extension area specialist in winter cereals) and Cavalier County Extension agent Ron Beneda has given producers answers they need to grow canola confidently and profitably. Coupled with the work of Scott Halley, Langdon REC plant protection scientist, and Mukhlesur Rahman, canola breeder, this research assures producers that a strong research and Extension canola program will continue.

"When you consider the high and growing demand for the health benefits of canola oil, there is no doubt that canola is here to stay," Mehlhoff says.

For more information: Randy Mehlhoff, (701) 256-2582, randall.mehlhoff@ndsu.edu

“Extension has made me the successful farmer that I am. Without Extension, I would not have had the funds to contribute to the new hospital in Jamestown.”

Rural Jamestown, N.D., farmer

NDSU Studies the Economics of Raising Soybeans

To improve soybean yields economically, producers are exploring combinations of production management strategies. NDSU is conducting a soybean intensive management study to examine combinations of planting rates, row spacing and special foliar inputs to identify the most profitable combination.

Six site-years of data have been generated since 2008 from trials at Carrington and Prosper, according to Greg Endres, NDSU Extension Service area agronomist at the Carrington Research Extension Center, and Hans Kandel, NDSU Extension Service agronomist in Fargo.

"Planting rates of 150,000 and 200,000 pure live seeds (PLS) per acre have been compared with an average early season established stand of 138,000 and 175,000 plants per acre, respectively," Endres says. "NDSU currently recommends an established soybean stand of 150,000 plants per acre, with a variance of 10 percent, to maximize yield potential. Current results from the study indicate a yield advantage of just less than 1 bushel per acre, or 1.5 percent, averaged across site-years for the high planting rate. However, when costs and benefits are calculated, the lower planting rate is more economical."

Fourteen-inch row spacing has averaged 1.1 bushels per acre or about a 2 percent greater yield than using 28-inch rows. This confirms other university data indicating a higher yield potential with narrow rows versus wide rows, Kandel says.

Special foliar inputs, including a nutrient combination, plus a growth promoter at early vegetative stages, were applied sequentially. This was followed by a fungicide treatment during the flowering to early pod formation stages. Across site-years, the special inputs increased soybean yield 2.2 bushels per acre, or about 4 percent, compared with the untreated check. However, there was only a modest return on investment. Farmers should use caution when considering additional inputs beyond recommended management practices that are based on university research.

Study results indicate the combination of planting 150,000 PLS per acre in 14-inch rows, followed by the combination of special foliar inputs, is providing the highest return on investment among the options explored.

For more information:
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Hans Kandel, (701) 231-8135, hans.kandel@ndsu.edu

Building Projects Enhance
Research Extension Centers

Two building projects were completed in 2011 at NDSU Research Extension Centers in Williston and Langdon. The projects were supported through funding by the 2011 state Legislature.

An addition to the Ernie French Center was completed at the Williston REC. The addition includes seed and processing rooms; irrigation, soils, horticultural and agronomy research laboratories; and additional office space for WREC staff.

The addition is called the Neil Riveland Seed Processing-Research Laboratories in honor of Riveland's 40-plus years of work at the WREC. As an agronomist, Riveland did crop variety testing of small grains and alternative crops, herbicide evaluations of small grains and alternative crops, and research on no-till and minimum-till production and cropping systems.

The Langdon REC went green with the completion of a heating and cooling system at the headquarters building. The system provides the center with an environmentally friendly source of energy while reducing heating and cooling costs by 50 percent.

For more information:
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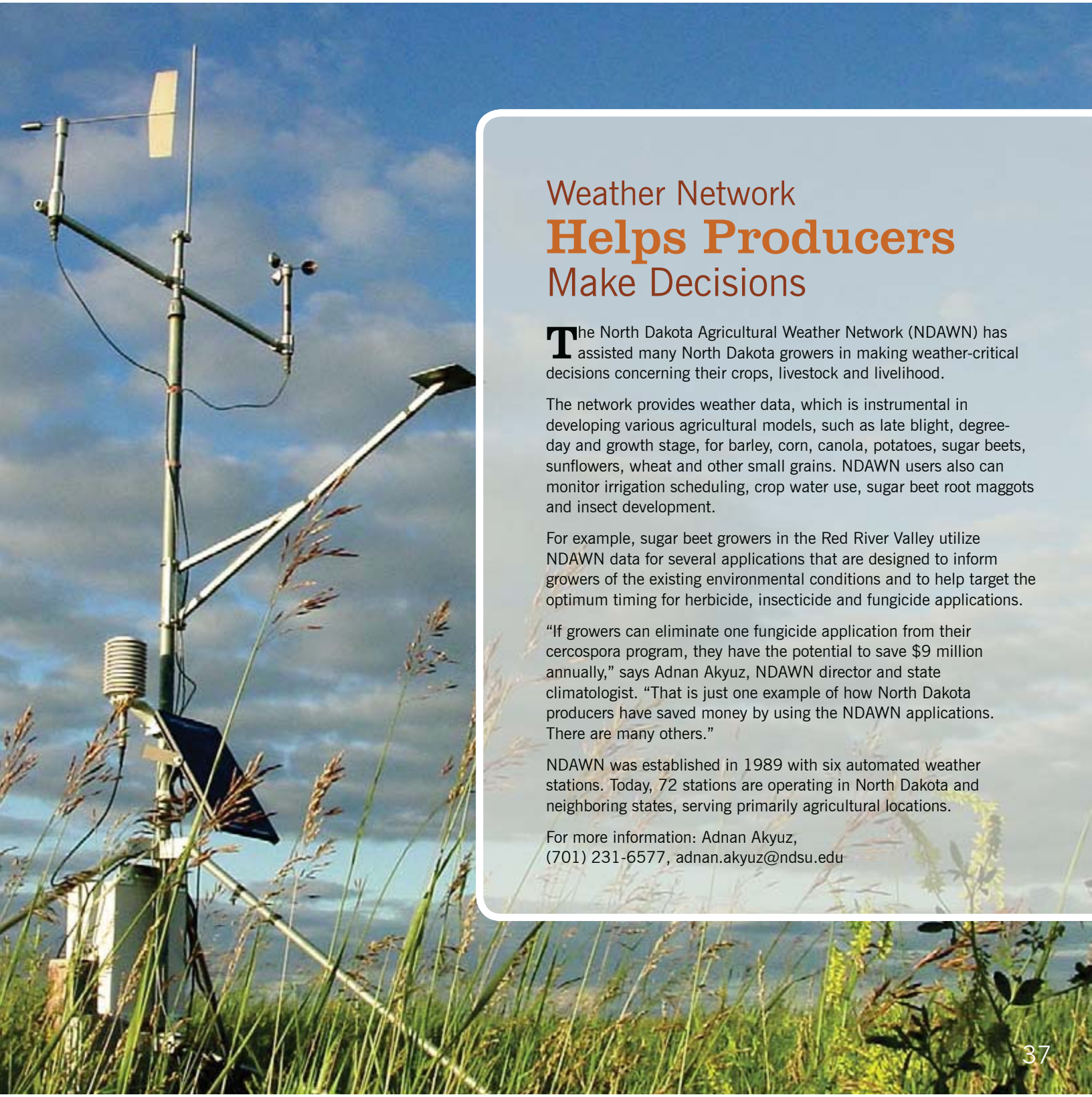

Weather Network
Helps Producers
Make Decisions

The North Dakota Agricultural Weather Network (NDAWN) has assisted many North Dakota growers in making weather-critical decisions concerning their crops, livestock and livelihood.

The network provides weather data, which is instrumental in developing various agricultural models, such as late blight, degree-day and growth stage, for barley, corn, canola, potatoes, sugar beets, sunflowers, wheat and other small grains. NDAWN users also can monitor irrigation scheduling, crop water use, sugar beet root maggots and insect development.

For example, sugar beet growers in the Red River Valley utilize NDAWN data for several applications that are designed to inform growers of the existing environmental conditions and to help target the optimum timing for herbicide, insecticide and fungicide applications.

“If growers can eliminate one fungicide application from their cercospora program, they have the potential to save $9 million annually,” says Adnan Akyuz, NDAWN director and state climatologist. “That is just one example of how North Dakota producers have saved money by using the NDAWN applications. There are many others.”

NDAWN was established in 1989 with six automated weather stations. Today, 72 stations are operating in North Dakota and neighboring states, serving primarily agricultural locations.

For more information: Adnan Akyuz,
(701) 231-6577, adnan.akyuz@ndsu.edu

NDSU Helps Restore Native Prairie in the Badlands

In April 2007, the U.S. Forest Service acquired the Ebert Ranch, which lies along the Little Missouri River in northern Billings County. It is partially the historic value of the ranch that led to the purchase because the property lies directly across the river from Theodore Roosevelt's historic Elkhorn Ranch.

The long-term goal is to have the view become the same today as the one observed by Roosevelt at his Elkhorn Ranch many years ago.

While a majority of the acquired land consists of native prairie, there is approximately 340 acres of land that was converted to crop production many years ago. It was with these cropland acres in mind that the Forest Service contacted the NDSU Hettinger Research Extension Center to assist with the conversion of these lands back to native prairie.

In 2010, 340 acres of cropland were planted to forage cover crops, including oats, milo, barley and millet, to reduce weeds and improve soil conditions. In 2011, approximately 114 acres were converted back to native prairie, with approximately 29 acres being devoted to research plots that will test how a variety of native plantings accomplish the goal of restoring native plants on former croplands in the Badlands region. The research is needed to provide management recommendations to the Forest Service, state and federal land management agencies, and livestock producers.

"This exciting partnership among the NDSU Hettinger Research Extension Center, Forest Service and numerous conservation groups has the potential to improve our understanding of prairie restoration in the Badlands," says Ben Geaumont, wildlife and rangeland research scientist at the Hettinger REC. "It also will provide valuable data on forage cover crop production in the region and potentially bridge the perceived gap between conservation and agriculture."

For more information: Ben Geaumont, (701) 567-4323, benjamin.geaumont@ndsu.edu

Progress Continues

on NDSU Greenhouse

Phase II of work on the greenhouse on the west side of the NDSU campus is complete.

The state-of-the-art facility will allow scientists to do very precise, high-quality research to benefit producers and the state's economy, according to Ken Grafton, vice president for Agriculture and University Extension, director of the North Dakota Agricultural Experiment Station and dean of NDSU's College of Agriculture, Food Systems, and Natural Resources.

With the completion of phase II, 56 greenhouse spaces are available for agricultural research. In addition, support areas, such as vernalization and misting chambers, laboratories, spray booths, seed drying and cleaning areas, growth rooms and long-term seed storage areas, are available.

Phase III of the $32.5 million greenhouse will include a biosafety level 3 lab, more growing areas and three additional greenhouse ranges.

"The biosafety level 3 area will allow scientists to work with organisms that are not native to North Dakota but could pose a threat if and when they arrive in the state," says Julie Hochhalter, NDSU greenhouse manager.

When completed, the facility will have about 100 separate environmentally controlled chambers.

For more information: Ken Grafton,
(701) 231-7655, k.grafton@ndsu.edu
Julie Hochhalter, (701) 231-5577,
julie.a.hochhalter.1@ndsu.edu
www.ag.ndsu.edu/greenhouse

“NDSU’s research efforts promise to provide significant benefits to the value of the hard red spring wheat crop for producers as well as customers.”

North Dakota commodity organization official

New Crop Varieties **Released**

Work continues to develop and release new crop varieties to increase producer profits through research and testing by the North Dakota Agricultural Experiment Station, Research Extension Centers across the state, Main Experiment Station in Fargo and various NDSU departments.

In 2011, Prosper hard red spring wheat was a joint release by the North Dakota Agricultural Experiment Station and Minnesota Agricultural Experiment Station.

It is a conventional to semidwarf variety with an early to medium-early maturity.

Prosper has a very high yield that equals or betters Faller. It is moderately resistant/moderately susceptible to scab and is resistant to stem rust. Based on preliminary reports from 2010 and 2011, Prosper appears to be susceptible to a new leaf rust race that is emerging in the region. Prosper's average protein content and test weight are similar to Faller, and it has a high flour extraction. In addition, it has good milling and baking qualities similar to Faller.

The North Dakota Agricultural Experiment Station also released Newburg oats in 2011.

Newburg has excellent yield potential. In field trials, Newburg outyielded the majority of commercial oat varieties. It exhibits good resistance to the prevalent races of crown and stem rust.

The protein level of Newburg is similar to other high-yielding commercial oat cultivars and its groat percentage is similar to Rockford. It heads out approximately one day earlier than Rockford and is similar to slightly taller than Rockford. It produces a proportion of kernels that pass through a 5/64-inch sieve similar to Souris but produces grain with a better kernel weight.

"Developing new varieties to improve yields, fight disease or overcome various weather conditions will benefit producers and the state's economy," says Richard Horsley, NDSU Plant Sciences chair.

For more information: Richard Horsley, (701) 231-8142, richard.horsley@ndsu.edu

Energy Beets

Hold Promise as Fuel

After years of research by NDSU's Agribusiness and Applied Economics Department and the Green Vision Group, energy beets have been grown successfully in seven yield plots across the state, including western North Dakota. Yields have approached 28 tons per acre on dry land and 38 tons per acre using irrigation, which is very comparable to Red River Valley yields.

"Gross returns per acre for energy beets in the state approach $893, compared with $386 for corn and $292 for soybeans," says Cole Gustafson, who leads the project. "Also, adaptability, drought resistance and twice as much ethanol production per acre compared with corn make energy beets a productive and lucrative feedstock alternative to corn ethanol."

The project has just completed phase one, which evaluated the initial project feasibility and agronomic potential of raising beets in nontraditional regions. Phase two of the project will expand yield trials to additional regions, develop front-end processing technology for the processing plants, evaluate the potential for storing and processing beets throughout the year, and obtain a new federal crop insurance program for energy beets. Phase two is expected to last through 2013.

If research results continue to be positive, construction of a commercial plant will begin with phase three in 2013. Promoters of energy beets envision building 12 facilities in North Dakota.

Economic impact projections show an additional $380 million in added farm production will flow through the state annually when all 12 plants are operational.

For more information: Cole Gustafson, (701) 231-7096, cole.gustafson@ndsu.edu

NDSU and DPI Australia Form Research Partnership

NDSU and the Department of Primary Industries (DPI) of Australia have joined forces to develop improved crop varieties.

The two institutions will focus on cereals, grains and legumes research to deliver plant varieties with high productivity and adaptation to new climates in both hemispheres.

DPI is responsible for agriculture, fisheries, earth resources, energy and forestry in the state of Victoria. The joint venture is part of DPI's $230 million Agribio venture with LaTrobe University in Bundoora, a suburb of Melbourne. NDSU will be working with the Victorian AgriBiosciences Centre (VABC) at LaTrobe University.

"North Dakota producers will benefit by having access to modern technologies that will accelerate the development of improved cultivars," says Ken Grafton, NDSU Agriculture and University Extension vice president, North Dakota Agricultural Experiment Station director and dean of the NDSU College of Agriculture, Food Systems, and Natural Resources. "Our breeding programs will be enhanced by the application of state-of-the-art technologies with the goal of streamlining and accelerating the line selection process."

The VABC has a major gene discovery platform for discovering important genes that can improve the productivity of plants, such as wheat and cool-season legumes, and the capability to generate novel transgenic plants carrying new traits of importance. The VABC also has a modern high-throughput molecular marker program and the largest dedicated bioinformatics facility in the Southern Hemisphere.

"The goal of the agreement is to develop mutually beneficial programs that lead to the improvement of North Dakota crops," says Phil McClean, an NDSU Department of Plant Sciences professor and an assistant director of the NDSU AgBiotechnology Center of Excellence. "We will work together by sharing resources and expertise in the areas of genetics, molecular genetics and gene discovery."

For more information:
Ken Grafton, (701) 231-8520, ndsu.exp-dir@ndsu.edu
Phil McClean, (701) 231-8443,
phillip.mcclean@ndsu.edu

NDSU NORTH DAKOTA STATE UNIVERSITY

Agriculture and University Extension at North Dakota State University

The North Dakota Agricultural Experiment Station consists of seven Research Extension Centers placed strategically throughout the state and the Main Station in Fargo. We work to develop techniques and technologies to enhance the production and use of food, feed, fiber and fuel from crop and livestock enterprises.

The NDSU Extension Service provides the people of North Dakota with the research-based information they need to succeed in today's increasingly complex world and be prepared for the future. We have offices serving all of North Dakota's 53 counties and Fort Berthold.

www.ag.ndsu.edu

If you would like more information on the programs in this publication, contact the faculty and staff listed. If you would like more information about our other programs or have questions, comments or suggestions, please contact one of us.

Ken Grafton
Vice President for Agriculture and University Extension
Director, North Dakota Agricultural Experiment Station
Dean, College of Agriculture, Food Systems, and Natural Resources

Duane Hauck
Director, NDSU Extension Service

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NORTH DAKOTA
STATE BOARD OF AGRICULTURAL RESEARCH AND EDUCATION

October 25, 2012

Anita Thomas
Legislative Council
Bismarck, ND

RE: SBARE Update

Dear Legislative Council Members:

Following is a brief update on activities conducted by the State Board of Agricultural Research and Education (SBARE). If further clarification or information is needed, I would be happy to provide whatever is necessary. My contact information is below.

Over the past 18 months SBARE has:

- Mailed out over 300 requests for input to North Dakota Agriculture Stakeholders;
- Spent several days taking input from October 2011 to February 2012;
    - Over 70 verbal presentations were made to SBARE in regards to North Dakota's Agriculture needs;
    - An estimated 30 written comments also were received by SBARE;
- SBARE spent several months packaging, refining, and prioritizing Agriculture's needs based on the input received;
    - The foundational packaging of the needs resulted in approximately 20 initiatives for both Research and Extension. The packages were formed into something that was practical and possible to address the needs presented;
    - The initiatives were further refined, reduced and prioritized into five initiatives. Those five initiatives for NDSU Research and Extension were ranked from one to five with the number one ranking perceived as the highest need/priority;
        - All of the rankings were completed without dollar amounts attached. The rankings were based on need;
- Last session SBARE received two directives from the Senate Appropriations Committee and the House Appropriations E&E sub-committee:
    - Find a permanent funding mechanism for the declining oil revenues at the Dickinson Research & Extension Center, and;
    - Come back with a better solution for the seed cleaning facilities at the outlying Research and Extension Centers;

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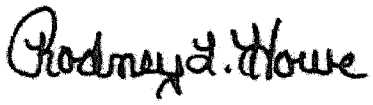
    - Both of these requests were addressed and will be presented in the upcoming legislative session;
- Declining, obsolete and unsafe facilities were addressed in the Capital Improvement list. Again, the Capital Improvement list was prioritized without dollar amounts attached. The Capital Improvement rankings were also based on need;
- SBARE reporting to appropriate agencies was made in a timely manner.

While there were many more SBARE activities, this brief update hopefully addresses the information needed by Legislative Council. Given that North Dakota Agriculture is the state's number one industry in terms of economic impact, Agriculture's needs were addressed in a very thoughtful and purposeful manner. We fully anticipate that the needs-based budget presented will provide a significant Return on Investment, which ultimately will sustain and enhance North Dakota on many different levels.

Sincerely,



Rodney L Howe
Chairman, State Board of Agricultural Research and Education
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701 567-3011

NDSU EXTENSION SERVICE

2013-15 Program Initiatives as Ranked by SBARE

1 Agents-in-Training and Summer Internships

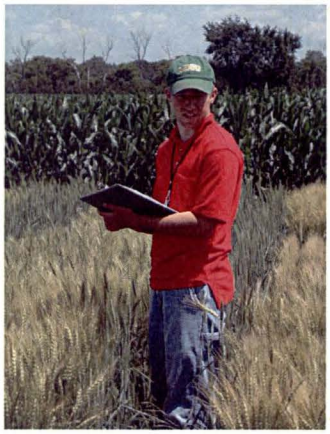
Situation: NDSU Extension continues to experience historic levels of retirements. Extension work can be extremely complex and challenging for recent college graduates. Agent-in-training positions can equip candidates with the skills to be a successful Extension agent. Summer internships are effective at recruiting students for future Extension careers.

Need: Salary pools for four 12- to 18-month agent-in-training positions and five eight- to 12-week summer student internships - $500,000

2 Livestock Development

Situation: The livestock industry is faced with many marketing and production challenges, but great opportunities exist in North Dakota to grow the beef industry. Enhanced capacity is needed to tackle a focused initiative on industry development. Current staff will be highly synergistic with a new initiative.

Need: Area livestock specialists (2.0 FTE) and operating funds, and support for Extension programming in livestock production economics (no FTE) - $590,000



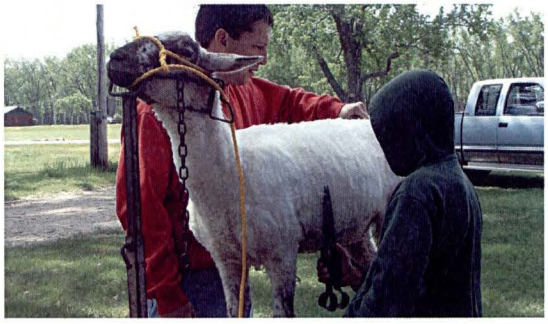
3 Crop and Resource Protection

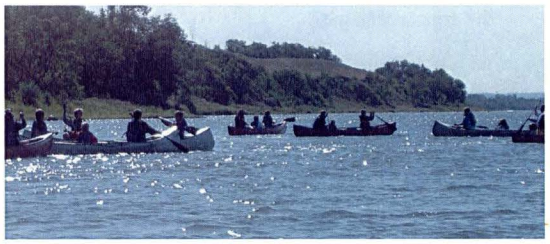
Situation: Crops are the major contributor to North Dakota's agricultural economy. Insect pests, plant diseases and weeds continue to evolve, threaten our diverse crops and require attention. Federal integrated pest management (IPM) program funds are not stable, and increased crop protection capacity is needed. Federal funding cuts have reduced Extension's program on protecting water quality.

Need: Partial funding for the state Extension IPM and Plant Diagnostic Lab coordinators; IPM state entomology specialist (1.0 FTE) and operating funds; increased technical support for the weed science and potato programs (2.0 FTE) and crop management at the NCREC (1.0 FTE); support and operating for the state water quality specialist - $960,000

NDSU EXTENSION SERVICE

2013-15 Capital Improvement and One-time Needs as Supported by SBARE





Western North Dakota 4-H Camp

Western North Dakota 4-H Camp, along the Missouri River near Washburn, N.D., is used extensively during summer months for day and overnight youth camps, and secondarily for Extension staff training. The three cabins and main lodge need renovations to fix run-down facilities, meet handicap accessibility and privacy needs for youth campers and adult counselors and volunteers. The renovations will reduce the lodging capacity, so additional lodging space is required in a new multipurpose camp building. The multipurpose building also will provide additional indoor activity space that is needed for camp programs during inclement weather. Plus, it will serve as a storm shelter, which is not available at the camp site. Improvements such as an archery range, ropes course and a small barn for livestock will be made to the infrastructure for camp programs. These renovations, new building and camp improvements will increase the capacity of Extension to provide excellent youth development programs through camp experiences. Funding of this capital request would provide the renovations to improve the facilities and safety for youth education programs and will increase the overall utility and value of the Western North Dakota 4-H Camp facilities by extending its use to about eight months of the year. - $1,900,000 ($950,000 general fund request and $950,000 other funds)

One-time Request

Replace 14 outdated, unsupported videoconferencing systems used for Extension programs including pesticide training, ag economics educational programs, marketing clubs, departmental seminars, and faculty and staff interviews - $110,000

Additional Request

Funding to provide technical assistance grants to soil conservation districts to help landowners reduce soil erosion, improve water quality, and enhance tree plantings, grazing lands and wildlife habitat - $150,000

NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

2013-15 Program Initiatives as Ranked by SBARE

Unranked Response to Legislative Request –
Addressing oil revenue shortfall at Dickinson Research Extension Center (DREC)

$800,000 Operating, Dickinson REC - Permanent funds to offset reduced oil revenue - Oil revenues have declined due to decreased production in the last several years. Past legislative sessions have made efforts to offset this reduced revenue, but these efforts were temporary. Last session, a request was granted to provide $800,000 to offset reduced oil revenues, but SBARE was tasked by the Legislature with determining and suggesting a permanent solution to this issue.

1 Crops Initiative - Enhancing Crop Development and Protection Efforts

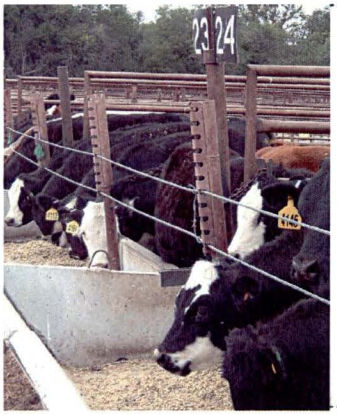
Situation: Agriculture accounts for 25 percent of the state's economy. Related activities (e.g., sale of products, manufacturing, transportation of commodities, professional services, processing) increase that to more than 40 percent. Developing improved crop varieties and protecting crops from diseases and pests are fundamental to North Dakota farmers' competitive success and profitability. Research in areas such as bioinformatics and statistical genomics will provide scientists with cutting-edge tools.

Need: Nematologist and support staff, bioinformaticist, statistical genomicist and support staff (5.0 FTE, Main Station) and operating support for crop variety development, disease control (Main Station, CREC, LREC, DREC); increased support for NDAWN (1.0 FTE, Main Station) - $2,470,000

2 Enhancing Research Capacity at the RECs

Situation: The RECs play a very important role in carrying out applied research in the Agricultural Experiment Station. Their involvement in important regional and state research activities has expanded, and support for these activities from farmers and ranchers is strong. The ability of the scientists stationed at the RECs to address important and emerging problems, such as weed and disease control, will increase as the technical sophistication of farming and ranching practices increases.

Need: Operating support (LREC, CGREC, NCREC, DREC, WREC, CREC, HREC); scientists to focus on control of weeds and plant pathogens (2.0 FTE: HREC,WREC); technical support (6.0 FTE: LREC, CGREC, NCREC, DREC, WREC, CREC) - $1,860,000



3 Livestock Initiative - Improving Livestock Productivity and Protection

Situation: North Dakota livestock producers are committed to producing the safest, highest-quality food products. Increasing demand for our meat products nationally and internationally will require additional emphasis on productivity and present additional opportunities for specialty markets and improved profitability. Through research, we can identify sustainable, profitable opportunities to improve livestock productivity in North Dakota.

Need: Scientists (2.0 FTE, Main Station); operating and technical support (4.0 FTE: HREC, CREC, CGREC, DREC); operating and technical support (4.0 FTE, Main Station) - $2,100,000

NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

2013-15 Capital Improvement and One-time Needs as Ranked by SBARE

1. Agronomy Laboratories

Agronomy laboratories at the Carrington, Hettinger, Langdon and Central Grasslands Research Extension Centers need to be replaced. Current facilities (an old potato warehouse, converted granary and an equipment storage building with a dirt floor, for example) were not designed as lab space and do not meet worker safety and protection standards. Current facilities also lack modern research technology and storage space. New labs would provide adequate facilities to conduct research and compile research data that the region's producers need to solve crop production problems. - $5,925,000

2. Seed-cleaning Plants

Seed-cleaning facilities at NCREC, CREC, WREC, and LREC need to be replaced. Current facilities are antiquated, lack reliable capability to ensure good seed quality, are slow and inefficient. Current facilities were designed to handle cereal crops and are not capable of cleaning pulse crops and other fragile seed that are in high demand by the state's farmers. Also, these facilities pose considerable worker safety issues. SBARE was charged with developing a plan to determine the best, cost-effective model to replace these out-of-date facilities. SBARE chose a model that allows for four self-contained (portable) seed conditioning units at each of the centers that produce foundation grade seed which would meet producer demands for high quality seed of new, high yielding, high quality varieties. - $3,470,000.

3. Livestock Facilities

The Carrington Research Extension Center needs a multiuse feedlot research support facility and the addition of at least 16 pens to improve its feedlot research capabilities, assist in sustaining Institutional Animal Care and Use Committee compliance, attain worker protection standards and reduce maintenance costs for equipment. Sixteen more pens would hold 160 head of cattle and allow the center to conduct one additional experiment per feedout period. Additional pens would allow for more treatments and replications in feedlot studies. The Hettinger Research Extension Center is in need of a multipurpose livestock processing barn and educational facility to address the center's research needs and provide state-of-the-art training and educational events. - $1,650,000

One-time Request — Vet Diagnostic Lab

Identifying and preventing disease outbreaks in the animal herds in the state is the responsibility of the Veterinary Diagnostic Lab (VDL). Livestock feeds can be tested for mycotoxins, molds, and phytoestrogens. Liquid chromatography with mass spectrometry capability (LC/MS/MS) can be used to test animal feeds for natural contamination by field and storage molds. In addition, the expanding oilfield presents challenges to livestock producers in western North Dakota. Pipeline breaks, semi-truck chemical spills, and down-hole accidents can contaminate ground and surface water sources. The proximity of livestock to drilling sites can result in poisoning from ingestion of water/feedstuffs contaminated with crude oil, condensate, salt water, heavy metals and/or caustic chemicals. Diagnosis of these cases requires sophisticated equipment. - $400,000 equipment