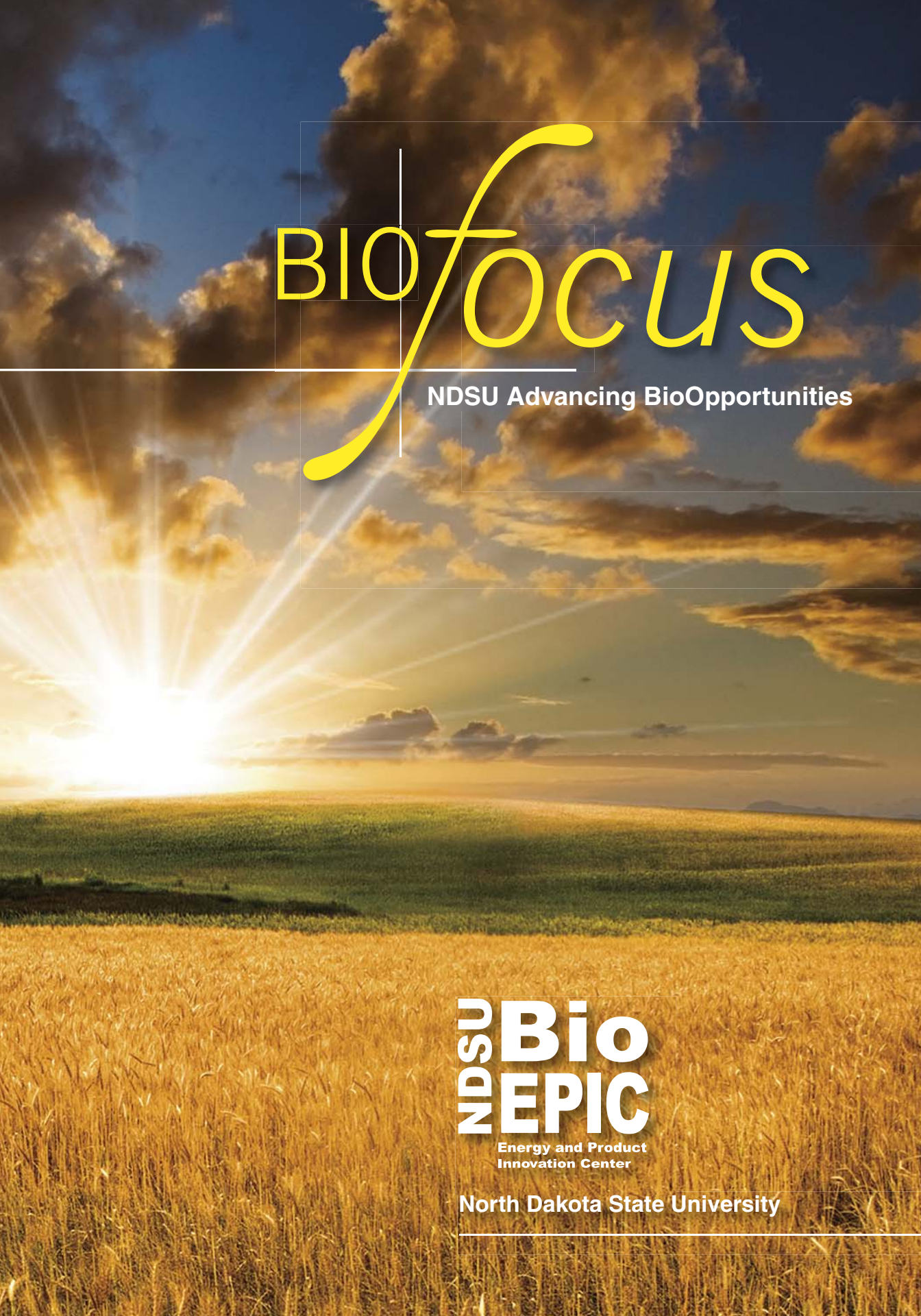


BIO focus

NDSU Advancing BioOpportunities

NDSU BioEPIC
Energy and Product Innovation Center

North Dakota State University

Today's research, tomorrow's results

Rising fuel prices. Dependence on foreign oil. Finding new uses and markets for North Dakota's agricultural products. Enhancing the state's economy. Concerns about the environment. These are a few reasons for North Dakota to expand its role in producing renewable energy and bioproducts, and North Dakota State University is at the forefront of that effort.

The university's expertise in crop production, harvesting, processing and storage provides a strong foundation to move this endeavor forward. To focus its resources in research, technology, Extension and education, NDSU created the Bio Energy and Product Innovation Center. NDSU BioEPIC is a collaboration that encompasses many disciplines all working toward the same goals:

- Improve crops grown for biomass
- Develop new technologies to increase the efficiency and profitability of converting biomass to biofuel and other uses
- Assess economic opportunities and public policy that can lead to a viable biomass and bioproduct industry in the state and revitalized communities while ensuring a sustainable and healthy environment

The NDSU Extension Service gathers the results of this research and makes the information available throughout the state and region in a variety of formats.

BioFocus is a snapshot of NDSU's bioenergy-related initiatives.

www.ndsu.edu/bioopportunities

Production and Conversion

As the bioenergy industry grows, so does the demand for crops that could be converted to biofuels.

To meet that demand, NDSU researchers are involved in multidisciplinary efforts to breed crop varieties with higher oil and starch content. They also are researching whether perennial grasses and various agriculture residues could be turned into biofuel. Other NDSU research focuses on testing the efficacy of fuel from alternative energy sources.

Production

Substituting field peas

NDSU has completed a technical and economic feasibility study on replacing corn with fractionated field peas for ethanol production. Field pea starch results in higher conversion rates and greater ethanol production. The distillers grain coproduct from ethanol produced with field peas also has higher protein.

At the time of the study, these advantages were not sufficient to offset the cost differential between peas and corn. However, with recently high corn prices, peas now are economically viable, NDSU biofuels economist Cole Gustafson says.

Biomass:
from desktop to field

Research on multifunction biomass production from high-diversity Conservation Reserve Program (CRP) grasslands is indicating that combinations of prairie grasses are highly productive, more stable and less prone to weed invasion than those produced in a monoculture.

The goal of this research is to produce a detailed desktop model of plant and soil interactions for efficient and effective management of CRP land for biomass production for ethanol.

This variety combination will allow continuous harvest regardless of seasonal variations, according to NDSU scientist Mario Biondini. This means that in a wet year, some plants will grow well and others will be less active. In a dry year, the reverse may apply, so that in any type of climatic variation, the harvest should be constant.

Research is indicating that different combinations grow better in different areas of the state. Current research plots in eastern North Dakota have been under investigation for the past 10 years and include 50 different mixtures of plants that have different tolerances to weather and soil conditions, and varying heights and root systems. In western North Dakota, research has been active for the past three years. More than 70 different mixtures are under research there.

Research plots also are monitored for production under three harvest conditions to assess whether this makes a difference in production. These are: no harvest (control), every year harvest and every other year harvest.

Sugar beet pulp

Preliminary research is being conducted into the use of sugar beet pulp as a feedstock for ethanol production. This feedstock has potential because it hydrolyzes (breaks down) without the use of harsh thermochemical pretreatments that are required for perennial grasses and other biomass feedstocks, according to NDSU scientist Scott Pryor.

Another primary advantage of sugar beet pulp as an ethanol feedstock is that transportation and storage are not an issue and add little to no cost to the process. Feedstock composition in sugar beet pulp presents unique but surmountable challenges from what would be found with other feedstocks.

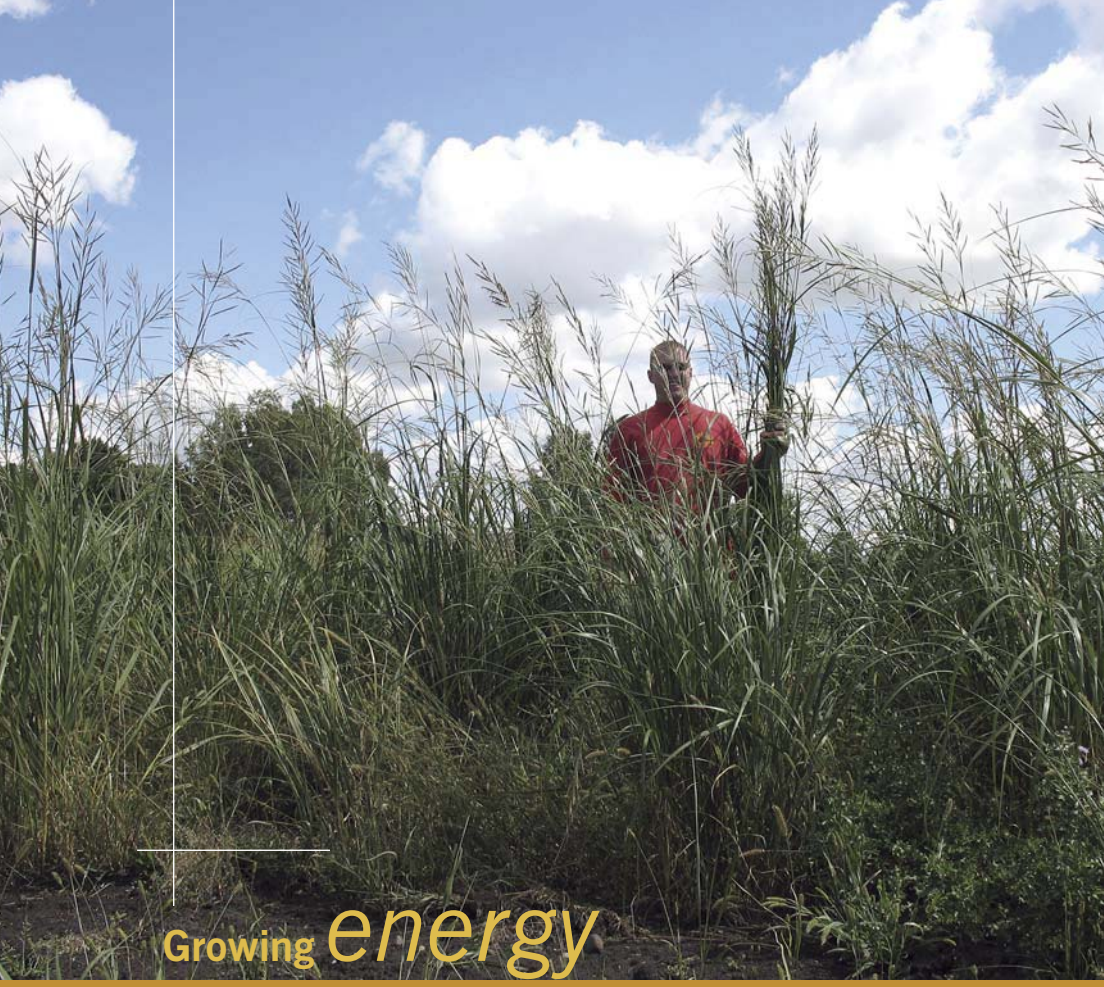
Oilseed development

NDSU continues to research and breed canola varieties to produce higher oil content and quality, as well as resin and meal properties that affect the quality of composite materials made from coproducts.

High-quantity seed analysis both in North Dakota during the summer and in Chile during the winter season provide rapid screening of canola seed.

Results to date have identified lines of germplasm that have substantial improvements in oil content per acre, relative to check varieties, says Bill Wilson, co-principal investigator in the NDSU Oilseed Center of Excellence.

The center is in the process of determining the best path to begin releasing these varieties and the extent they are released as open pollinated and/or hybrids. The center also is studying biodiesel cold-weather performance.



Growing *energy*

Preliminary data from an NDSU study to evaluate perennial grasses for biofuel production suggest warm-season grasses, such as switchgrass, grow well in areas with adequate moisture. However, cool-season grasses, such as tall and intermediate wheatgrass, appear to grow better in years or areas with limited moisture.

This is the second year of the 10-year study, a collaborative effort of NDSU's Carrington, Central Grasslands (Streeter), Hettinger, North Central (Minot) and Williston Research Extension Centers.

So far, irrigated plots at Hettinger and dryland plots at Carrington have been the top producers, yielding more than 6 tons of switchgrass or switchgrass mixed with Altai wildrye.

The researchers plan to harvest only half of the 20 grass plots this year and then all of them next year. They hope to determine whether they'll get enough grass to make harvesting every other year possible, or whether they'll lose grass.

Researchers also have evaluated the effect of using glyphosate, a nonselective systemic herbicide, to control cool-season weedy grasses in stands of switchgrass. Preliminary results indicate switchgrass production increases twofold where the cool-season grasses were controlled. Weed control studies are continuing.

Assessing U.S. capabilities

NDSU's Carrington Research Extension Center is part of a U.S. Department of Energy project to determine the nation's ability to produce biomass feedstock crops that can be converted to cellulosic ethanol.

The joint DOE/U.S. Department of Agriculture study is designed to establish the resource base and future potential for a large-scale biorefinery industry. The objective is to assess whether the U.S. is capable of providing enough biomaterial to reach the Energy Independence and Security Act of 2007 mandate of producing 36 billion gallons of fuel per year from renewable sources by 2022.

This project is divided into six sections, each focusing on a specific type of biomass feedstock. They are: switchgrass, miscanthus, sorghum, energycane (a type of sugarcane), corn stover, and biomass grown on Conservation Reserve Program land.

The Carrington REC will represent the northern Plains region in the assessment of the CRP's contribution to the nation's biomass feedstock. The center is taking the lead in identifying and organizing the study locations and collaborating scientists. Georgia, Kansas, Missouri, Montana and Oklahoma also are involved in the CRP study.

Conversion

Going strong

This is the fourth year NDSU's North Central Research Extension Center near Minot has run a tractor on biodiesel made entirely from canola oil.

"We've had zero problems with it," center research specialist Gary Willoughby says about the 10-year-old tractor.

Tests show that using canola-based biodiesel hasn't affected the tractor's horsepower. Also, the canola biodiesel appears to clean the tractor's engine. The engine oil stays cleaner longer now than it did when fossil fuel powered the tractor.

Willoughby also is testing the tractor's ability to start and operate in cold weather. Last winter, it started at 27 degrees without being plugged in. This winter, he'll try fuel mixtures that include No. 1 diesel fuel and degelling additives.

Running on hydrogen

Who needs gas or diesel? One of the pickups at the North Central Research Extension Center runs on hydrogen made right at the center.

NDSU is partnering with Basin Electric Power Cooperative and Verendrye Electric Cooperative on the hydrogen-creation project. The center uses wind energy to power an electrolyzer that removes hydrogen from water. NDSU also has a farm tractor that runs on hydrogen.

Bioproducts

The development of a bioenergy industry creates a supply of coproducts providing opportunities to find new uses and markets for the region's agricultural products. NDSU leads research on converting these coproducts into livestock feed, food for humans and a variety of other materials including adhesives, lubricants and nutriceuticals.

NDSU researchers are developing technology to convert agricultural residues, such as wheat straw, into ethanol and strong, light-weight materials that could substitute for fiberglass and petroleum-based composites.

Canola meal **composites**

NDSU is starting research on processing canola meal (which is a high-protein meal with low value as an animal feed) into biobased plastics, biocomposites or other novel applications. Soybean meal proteins have been used in similar processing, but the unique canola protein composition may provide improved properties in some applications, NDSU scientist Scott Pryor says.

More **protein**

Producers can use corn condensed distillers solubles (CCDS), another ethanol byproduct, as a protein supplement to beef up low-quality forage-based cattle diets, NDSU animal scientists have determined.

Now the researchers are answering two other questions from producers:

- Should CCDS be mixed with forages or fed separately?
- How much CCDS can producers include in their cattle's feed rations?

The answer to the first question is either way, according to NDSU Animal Sciences researchers Joel Caton, Lindsey Coupe and Greg Lardy. They say the answer to the second question is the more CCDS in the diet, the more weight the cattle gain.

Biocomposites

Composite materials are excellent alternatives to steel and other metals because of their strength and light weight. Composites consist of a matrix (base material) reinforced with fibers.

NDSU scientists Chad Ulven and Scott Pryor are producing composites from renewable resources. They use a canola oil-based resin and canola meal separately as a composite matrix, while deriving fiber from corn distillers dried grains and flax stem fiber. These resources offer unique, desirable functional properties for composite applications and are available in ample amounts in the north-central U.S., scientists say.

Current research is on a small scale, making samples large enough to do strength and durability tests. The next step is to make a larger scale practical application. One example is a one-quarter scale tractor. Interest in the product is high, but large-scale funding is needed to continue.

Also, a short fiber produced from dried distillers grain (a corn ethanol coproduct) is close to commercial application. Two companies are testing it in trials in an industrial setting.

Combating sulfur toxicity

NDSU animal scientists are studying whether feeding lambs more thiamin, a B vitamin, can combat the potentially toxic effects of sulfur in dried distillers grain plus solubles (DDGS).

DDGS is a coproduct of ethanol production that livestock producers are including in their animals' feed ration. Ethanol production removes starch from corn. In that process, sulfuric acid is added to improve fermentation, which boosts sulfur levels in DDGS.

"In some cases, it's approaching toxic levels," says Animal Sciences researcher Greg Lardy. He is involved in the study along with Animal Sciences researcher Bryan Neville, NDSU Hettinger Research Extension Center director Chris Schauer and Hettinger REC animal scientist Michele Thompson.

Livestock producers want to know whether thiamin can counteract sulfur because high sulfur levels can lead to polioencephelomalacia, a brain disorder in ruminants.

Flax fiber

Flax fiber is a valuable biomass resource that can be used to produce specialty papers and serve as reinforcement in composite materials for a wide range of environmentally friendly parts used in ground transportation, automotive, marine and building industry sector applications.

However, at present, flaxseed producers simply burn the fiber in the field or ball it for low-cost paper because of demand, storage and transportation issues, NDSU scientist Chad Ulven says. At the same time, composite processors are not using flax fibers for their products because they are unsure of a consistent supply and quality of the fibers grown.

The composite processor requires a consistent fiber supply and quality, and the farmer needs a purchase guarantee to properly harvest and transport these fibers, Ulven says. Both also require fiber at the right price.

NDSU scientists are working to develop a simple and efficient flax fiber grading strategy out in the field using infrared technology. Researchers also are using a flax fiber processing pilot plant to develop a business plan to assess the potential of a large-scale flax fiber processing plant.

From vegetable oil to coatings

NDSU's Department of Coatings and Polymeric Materials is using funding from the North Dakota Soybean Council to synthesize derivatives of soybean oil for use in coatings cured by ultraviolet light in a process that produces rapid results with superior protections. These coatings are being used in many commercial applications, including coated flooring materials, researchers Dean Webster and Stuart Croll say.

Together with the U.S. Department of Agriculture, the department of Coatings and Polymeric Materials is using vegetable oils, particularly soybean and linseed oils, and other bioderived raw materials to synthesize polymers to produce environmentally friendly coatings having low levels of solvent or low volatile organic content.

Research is aimed at creating high-performance polymers that can penetrate markets that biobased materials haven't been able to compete in recently, such as the production of latex paints and industrial coatings. While biobased polymers previously were used in most coating applications, petroleum-based polymers, such as acrylics, eventually supplanted them in many uses. Through proper design of the molecular structure, the researchers intend to develop biobased polymer systems that can be used in coatings that meet current and future environmental regulations while having the required performance properties being met by petroleum-based polymers.

Glycerol as feed

Researchers at NDSU's Carrington Research Extension Center are getting very good results on a study evaluating the effects of including glycerol in beef cattle finishing diets. Glycerol is a coproduct of converting canola oil to biofuel.

Feedlot performance was not affected during the first three months the yearlings were fed the glycerol diets, according to animal scientist Vern Anderson and research specialist Breanne Ilse. They evaluated diets that contained increasing glycerol levels up to 18 percent, with decreasing corn in the rations. The highest glycerol diet consisted entirely of coproducts, such as wheat midds and distillers grains, compared with the control diet that contained 60 percent corn.

The researchers say the next step is for NDSU meat scientists to determine how glycerol affects carcass quality and the taste of the beef.

Making **food healthful**

Researchers Cliff Hall of NDSU's Department of Cereal and Food Sciences, Frank Manthey of the Department of Plant Sciences and Mehmet Tulbek of the Northern Crops Institute are looking at a process to extract colorants and health products and make food snacks from distillers grains, a coproduct from the production of ethanol.

A unique characteristic of distillers grain, primarily dried distillers grain (DDG), is its intense, bright yellow color, which is due in part to the carotenoids in it. Lutein and zeaxanthin, carotenoids in corn (a major crop for producing ethanol), have attracted much attention for their possible role in preventing cataracts and age-related macular degeneration, a condition that results in irreversible vision loss.

Developing a process to remove lutein and zeaxanthin from DDG would further add value to corn-based ethanol production, the researchers say. Although protocols exist to remove carotenoids, they have not been optimized or adapted to ethanol plants.

Optimization of the carotenoid recovery is a main focus of the NDSU research effort, with the intent of providing the food industry an additional source of carotenoids as a natural colorant and health ingredient for eyes.

The fractionation of the DDG into protein and fiber ingredients for snack foods is a second goal of the research. The final goal is the application of deodorized DDG in food systems. Deodorization is a process used to remove volatile compounds responsible for the odor in materials. An odor-free DDG product could find wider use as a food ingredient, the researchers say.

The Renewable Fuels Association estimates that 12 million metric tons (26.4 billion pounds) of distillers grain are produced annually. An estimated 20 million metric tons will be generated by 2012.

Researchers say other value-added products could be realized from corn-based ethanol production. Carbon dioxide (CO_2) is one example. About 17 to 18 pounds of CO_2 are generated for every bushel of corn, which is equivalent to the amount of distillers grain produced per bushel of corn. Thus, approximately 26.4 billion pounds of CO_2 could be captured and used to produce other value-added products.

Sharing the Knowledge

NDSU has a wealth of knowledge to help North Dakota develop its energy resources and demonstrate how people can use energy more wisely. Along with student courses on biofuel production and bioprocessing, specialists extend NDSU research activities to the state's communities and 4-H members with targeted programs, events and publications to ensure that everyone benefits from this knowledge.

NDSU advances energy development, efficiency

NDSU plays a vital role in helping North Dakota create an energy policy and develop the state's energy resources.

Faculty provide expertise to a statewide organization – the North Dakota Alliance for Renewable Energy – and an appointed commission – the North Dakota Empower Commission – that promote the development of sustainable, environmentally sound energy solutions and.

The **North Dakota Empower Commission**, a 14-member board established by the 2007 Legislature, has developed ideas and recommendations to help further Empower ND, the state's comprehensive, multiresource energy policy. The commission's effort includes 10 key goals, 49 policy recommendations and nearly 100 action items that build on the progress Empower ND has made since its creation in 2001.

NDSU's role in this effort includes reporting on the Extension Service's energy efficiency educational program that's focused on agriculture and buildings, providing background information on energy efficiency opportunities and suggesting methods for North Dakota to become more energy efficient.

"Increasing the efficiency of energy use is the most cost-effective method of reducing the impact of rising energy costs on families, farms and businesses in North Dakota," says Ken Hellevang, director of the NDSU Bio Energy and Product Innovation Center.

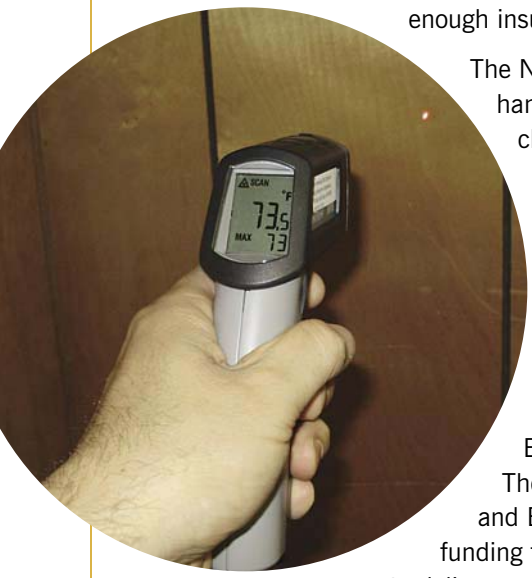
NDSU faculty conducting research and education related to biomass also provided input to the North Dakota Empower Commission.

The **North Dakota Alliance for Renewable Energy** is an association of individuals and companies with the goal of compiling and disseminating information to promote the development and use of renewable energy, including wind, biofuels, biomass and solar energy, and encourage energy conservation.

Faculty from the NDSU Agricultural and Biosystems Engineering Department and NDSU Extension Service work with alliance members to provide education related to energy. Carl Pedersen, NDSU Extension Service energy educator, serves as chair of the alliance's Conservation and Efficiency Committee. Hellevang assists the alliance's biomass and wind committees.

NDSU shares
energy-saving expertise

Wish you had an easy way to tell whether your house has enough insulation?



The NDSU Extension Service can help. It has hand-held infrared thermometers for people to check out at each county Extension office. Homeowners can use the thermometer to pinpoint areas that lack insulation or let in cold air.

These thermometers are just one way NDSU helps North Dakotans make their homes, farm equipment, agricultural buildings and watering systems more energy-efficient.

Educational programs are another method. The NDSU Extension Service and Agricultural and Biosystems Engineering Department receive funding from the state Department of Commerce to deliver energy-related information and education to residents. Topics include agricultural, structural and irrigation energy efficiency; strip tillage; and biodiesel.

At 4-H Clover Camp, youth and their parents learn about energy conservation and wind energy, and design wind turbine blades.

NDSU also provides energy-saving information in publications. Publications and other energy information are available through the NDSU Distribution Center or online at NDSU's new energy Web site, www.ndsu.edu/energy.

Financial Impact

North Dakota is well-placed to capture the economic benefits of an emerging bioenergy industry, NDSU research shows.

Bioenergy could be a very substantial economic development opportunity for the state, perhaps the largest in a generation, agricultural economists in NDSU's Department of Agribusiness and Applied Economics say. They are studying the state's possible role in the growing biofuels and biomaterials industry and the financial impact on the state. Here is some of what they've found.

Research grant

A consortium led by economists in NDSU's Department of Agribusiness and Applied Economics will work to further develop and commercialize the technology to produce biobased products, thanks to an $800,000 grant from the North Dakota Industrial Commission.

The group will determine the technical and economic feasibility of building a pilot-scale production facility. That will include preparing a strategic business plan to bring together public- and private-sector resources to build the plant. The consortium also will examine potential markets for the plant's products and determine the plant's capitalization requirements and projected financial performance.

Impact huge

Bioenergy has the potential to provide a direct annual contribution to the state of more than $800 million.

This calculation is based on the assumption that the U.S. meets the Energy Independence and Security Act of 2007 mandate of producing 36 billion gallons of biofuels per year by 2022, according to NDSU agricultural economist Nancy Hodur. It also assumes North Dakota will produce ethanol equal to the percentage of the nation's biomass the National Renewable Energy Laboratory estimates the state could produce.

If North Dakota provides 8.6 percent of the potential biomass in the north-central U.S., it could be home to 16 cellulose biorefineries each turning out 50 million gallons of ethanol.

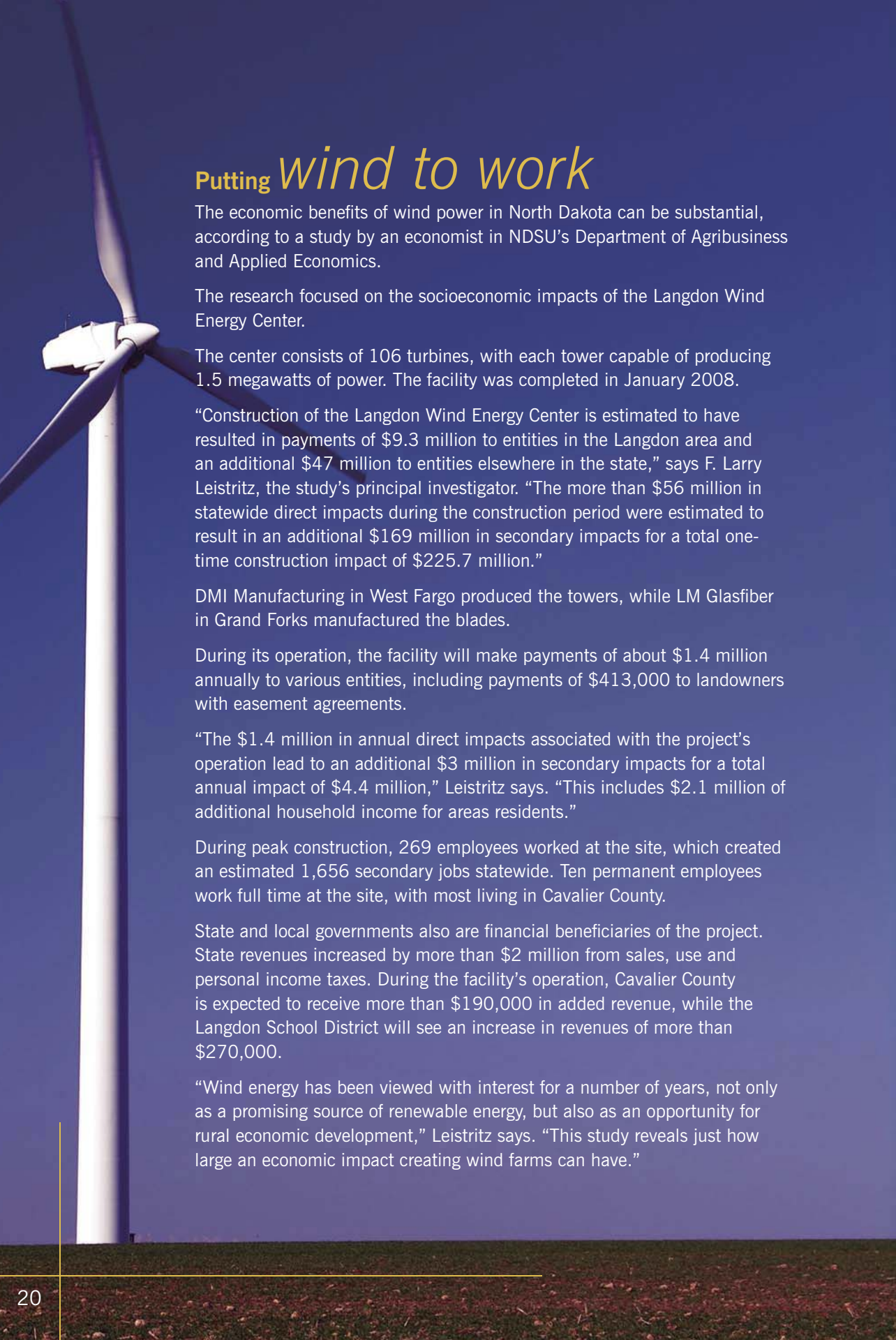
The direct economic impact of just one 50 million gallon plant to turn corn into ethanol is substantial — $16.8 million. But the impact of one 50 million gallon biorefinery converting wheat straw, a cellulosic material, to ethanol would be three times as much — $53.7 million.

Direct impact is money that enhances regional economic activity. It includes workers' wages and payments to buy feedstock to convert to ethanol and energy to run the plants.

The wheat straw plant's direct impacts would include $16.4 million in payments to producers for the wheat straw, $11 million for baling the straw, $8.8 for transporting it to the biorefinery and $2.7 million in payroll for 77 workers. The corn ethanol plant's direct impacts would include $8.25 million to buy coal from in-state sources and $3.6 million in wages for 40 workers.

"The economic impact of a cellulosic ethanol biorefinery is so much greater than a corn ethanol plant because a majority of the operating payments would be for production, harvest and transportation of feedstock — that is, wheat straw and other crop residues — that currently has no current commercial markets," Hodur says.

A wheat straw biorefinery also would have indirect impact of $131.5 million, while the ethanol plant's indirect impact would be $29 million. Indirect impacts include the increased economic activities of other businesses that service those directly involved in the plants.



Putting *wind to work*

The economic benefits of wind power in North Dakota can be substantial, according to a study by an economist in NDSU's Department of Agribusiness and Applied Economics.

The research focused on the socioeconomic impacts of the Langdon Wind Energy Center.

The center consists of 106 turbines, with each tower capable of producing 1.5 megawatts of power. The facility was completed in January 2008.

"Construction of the Langdon Wind Energy Center is estimated to have resulted in payments of $9.3 million to entities in the Langdon area and an additional $47 million to entities elsewhere in the state," says F. Larry Leistritz, the study's principal investigator. "The more than $56 million in statewide direct impacts during the construction period were estimated to result in an additional $169 million in secondary impacts for a total one-time construction impact of $225.7 million."

DMI Manufacturing in West Fargo produced the towers, while LM Glasfiber in Grand Forks manufactured the blades.

During its operation, the facility will make payments of about $1.4 million annually to various entities, including payments of $413,000 to landowners with easement agreements.

"The $1.4 million in annual direct impacts associated with the project's operation lead to an additional $3 million in secondary impacts for a total annual impact of $4.4 million," Leistritz says. "This includes $2.1 million of additional household income for areas residents."

During peak construction, 269 employees worked at the site, which created an estimated 1,656 secondary jobs statewide. Ten permanent employees work full time at the site, with most living in Cavalier County.

State and local governments also are financial beneficiaries of the project. State revenues increased by more than $2 million from sales, use and personal income taxes. During the facility's operation, Cavalier County is expected to receive more than $190,000 in added revenue, while the Langdon School District will see an increase in revenues of more than $270,000.

"Wind energy has been viewed with interest for a number of years, not only as a promising source of renewable energy, but also as an opportunity for rural economic development," Leistritz says. "This study reveals just how large an economic impact creating wind farms can have."

Switchgrass as fuel

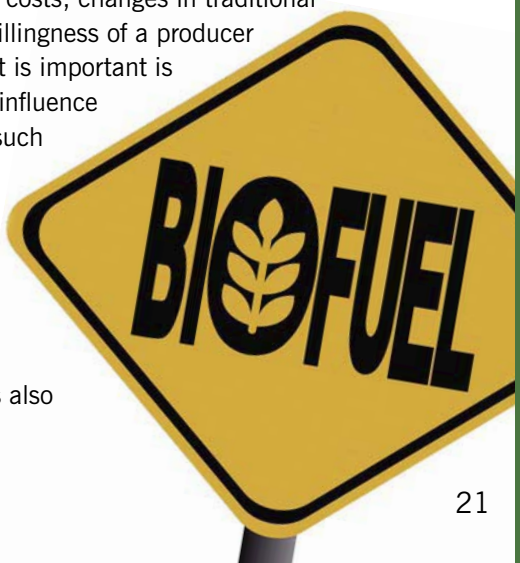
Economists in NDSU's Department of Agribusiness and Applied Economics are taking a hard look at the economic potential of switchgrass as a dedicated feedstock for cellulosic-based biofuels. Switchgrass is a warm-season perennial grass that is native to North Dakota and the region.

"We looked at switchgrass from two perspectives," economist F. Larry Leistritz says. "We studied farm-gate prices that would be needed for switchgrass to be competitive with net returns from traditional crops based on different levels of *soil productivity*. We also studied farm-gate prices that would be needed for switchgrass to be competitive with net returns from traditional crops based on different levels of *producer profitability*."

Break-even switchgrass prices were estimated as the price required to cover switchgrass production expenses and provide for the same level of net return from traditional crops.

The economists studied switchgrass production on three types of soils: marginal, average and high productivity. To break even with traditional crops, producers would need to receive $47 per ton from low-productivity soil, $67 per ton from average-productivity soil and $76 per ton from the most productive soil.

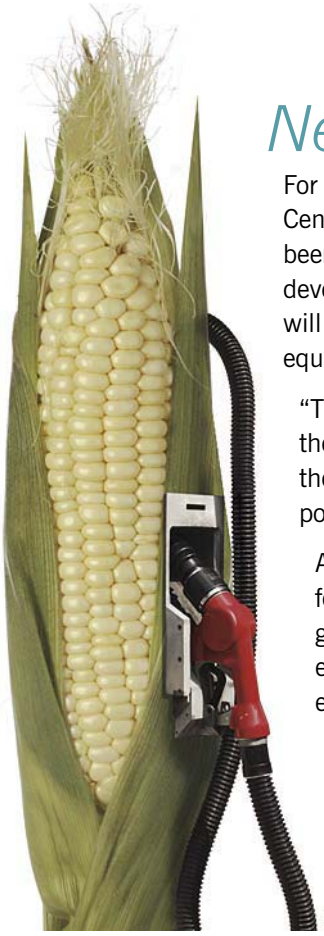
"Several variables, such as yield increases, fertilizer costs, changes in traditional crop prices and crop rotations, may influence the willingness of a producer to grow switchgrass," Leistritz says. "However, what is important is that we now better understand the factors that will influence the economic competiveness of herbaceous crops, such as switchgrass, with the more traditional crops. It also is important that energy industry leaders, policymakers and researchers now have additional information with which to continue evaluating the economic viability of cellulosic ethanol."



Dean Bangsund and Eric DeVuyst from the NDSU Department of Agribusiness and Applied Economics also were involved in the study.

Economic Development

NDSU strives to help North Dakota communities be ready to take advantage of economic opportunities. One of those opportunities is the development of a bioenergy industry in the state.



New plant

For more than two years, Chet Hill, Williston Research Extension Center area agricultural diversification/value-added specialist, has been working with a group of 23 farmers and businesspeople to develop and build an ethanol plant. The Yellowstone Ethanol Plant will process 18 million to 20 million bushels of corn per year, which equates to approximately 50 million gallons of ethanol.

"The plant is designed to produce 100 million gallons sometime in the future," Hill says. "What will set this plant apart from some of the others is that it will be powered by coal, while many others are powered by natural gas."

At the same time, Hill has been promoting more corn production for the plant and encouraging cattle ranchers to use dried distillers grain (DDG) as feed for their livestock. DDG is a coproduct of the ethanol production process. The plant will be capable of producing enough supplemental feed for 250,000 cattle.

"Some feedlots are using DDGs hauled in from the Red Trail Energy plant out of Richardton and the Blue Flint plant in Underwood, but the owners want to see a more local plant to reduce hauling costs," Hill says.

Going green

Some communities in the NDSU Extension Service's Horizons program are tapping into the university's expertise in energy efficiency to help them revitalize.

Bowdon residents, for example, hope to convert the closed Bowdon school into a multiuse facility with a fitness center, a shared-use commercial kitchen where local entrepreneurs can create products for sale, and lodging for hunters who come to the area.

The residents, who want to make the building as energy-efficient as possible, are getting advice from NDSU Extension Service energy educator Carl Pedersen on issues such as whether the building is insulated properly and how to make use of solar energy.

Energy assistance

NDSU soon will have an Extension Service specialist in energy engineering to create and lead education programs focusing on energy use and conservation in commercial, industrial and institutional settings primarily in western North Dakota.

This specialist will help businesses and institutions increase their energy efficiency. The specialist also will provide engineering assistance to businesses and institutions with energy-related projects, particularly in conservation and the development of alternative energy sources, including wind, solar, hydrogen, biodiesel and ethanol.

“Energy conservation and increased efficiency save money for individuals and businesses,” says Kathleen Tweeten, director of the NDSU Extension Service’s Center for Community Vitality. “This gives them more resources to purchase other goods and services and/or to produce more product for sale.”

The development of alternative energy sources enhances the local economy by increasing local income and spending. Energy developed in the state also creates new wealth if it is exported.

Providing energy engineering assistance is a joint effort of the NDSU College of Engineering and Architecture and Center for Community Vitality.

NDSU Bio EPIC

Energy and Product Innovation Center

Mission

The center provides North Dakota and the surrounding region with comprehensive, coordinated and collaborative resources in research, technology, Extension and education, leading to the economic viability of bioenergy and bioproducts to ensure a sustainable, healthy environment.

The NDSU Bio Energy and Product Innovation Center identifies and enhances opportunities for expanding North Dakota's role in producing renewable energy and bioproducts, and develops action plans for NDSU to work with agriculture, industry, organizations, institutes of higher education and government agencies to capture these opportunities.

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