



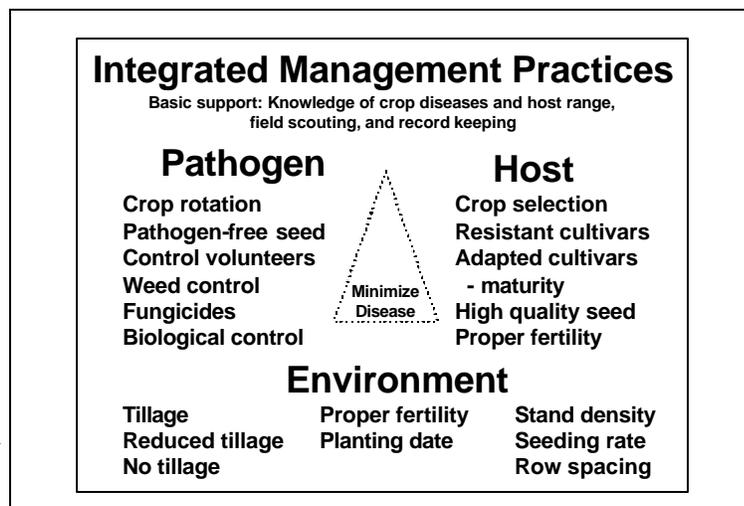
**Northern
Great
Plains
Research
Laboratory**

Managing Plant Disease Risk in Diversified Cropping Systems

Diversification of cereal cropping systems with alternative crops such as oilseed, pulse, and forage crops furnishes producers with a range of agronomic and economic options. Crop diversification also improves management of plant diseases through manipulation of host factors such as crop and cultivar selection, interruption of disease cycles through crop rotation, fungicide application, removal of weeds and volunteer crop plants, and modification of the micro-environment within the crop canopy using tillage practices and stand density. Management practices such as seed treatment, date and rate of seeding, balanced fertility, control of weeds, field scouting, harvest management and record keeping, can also be utilized to manage plant diseases.

A recent review paper evaluates the risks to diversified crop production systems associated with the major plant diseases in the Northern Great Plains and the influence of host, pathogen, and environmental factors on disease control (Krupinsky et al. 2002. *Agronomy Journal* 94:198-209). Principles to help producers reduce and manage risks from plant diseases are presented, along with strategies for countering Fusarium Head Blight (scab) and leaf spot diseases in cereals, Sclerotinia stem rot in oilseed and pulse crops, and Ascochyta blight and anthracnose in pulse crops.

The presence and severity of a plant disease is determined by the dynamic interaction of a susceptible crop (host), a causal agent (pathogen), and favorable environmental conditions (see figure). This interaction is known as the plant disease triangle. All three factors are required for disease development. A number of individual management practices can be used to reduce the impact of diseases and enhance crop yields by influencing these three factors. Producers should not rely exclusively on a single management practice but rather integrate a combination of practices to develop a consistent long-term strategy for disease management that is suited to their production system and location.



A number of management practices can be integrated to minimize plant disease.

Our Vision:

An economically sustainable and environmentally sound agriculture.

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Research Notes

Improving Protein Intake During Late Summer with Perennial Plants

By late summer most grasses are mature or maturing and have inadequate levels of crude protein to support good productivity in cattle. If cattle can't find less mature grass regrowth to graze, they will often decrease their intake of grass and increase their intake of palatable forbs like alfalfa, or shrub or tree leaves if available. There are several perennial forbs, shrubs and one small tree that we are evaluating at NGPRL as sources of crude protein for cattle in late summer.

The table below shows crude protein levels in three warm season grasses (big bluestem, switchgrass, and blue grama) with only blue grama having moderately good levels of crude protein by mid-August. It also depicts the high crude protein levels in yellow-flowered alfalfa, as well as Wytana saltbush, leadplant, dwarf indigo, and winterfat (all shrubs), and the tree caragana. Though the results are preliminary, these plants have good potential to compliment grasses in the diets of grazing cattle and improve their protein and energy nutrition in late summer.

Research evaluating protein levels in alternative forages is ongoing at NGPRL. For information on this research contact Scott Kronberg at (701) 667-3013 or kronberg@mandan.ars.usda.gov

% Crude Protein in Late Summer Forages

Forage	Crude Protein (%)
Big bluestem	5.4
Switchgrass	7.8
Blue grama	9.2
Wytana saltbush	13.8
Leadplant	15.8
Dwarf indigo	16.3
Winterfat	17.8
Caragana	20.0
Yellow-flowered alfalfa	20.9

Forage samples collected on 8/16/01.

Dynamic Cropping Systems Workshop

A workshop entitled "Dynamic Cropping Systems: Principles, Processes, and Challenges" has been scheduled for August 5-7, 2003 at the Holiday Inn in Bismarck, ND. Hosted by NGPRL, the workshop will highlight fundamentals of the dynamic cropping systems concept. The workshop will include topical presentations by scientists, a field tour, and comments from a panel of area producers. The workshop will be held in conjunction with the Great Plains Systems Network meeting.

International Team Completing NGPRL Water Erosion Study

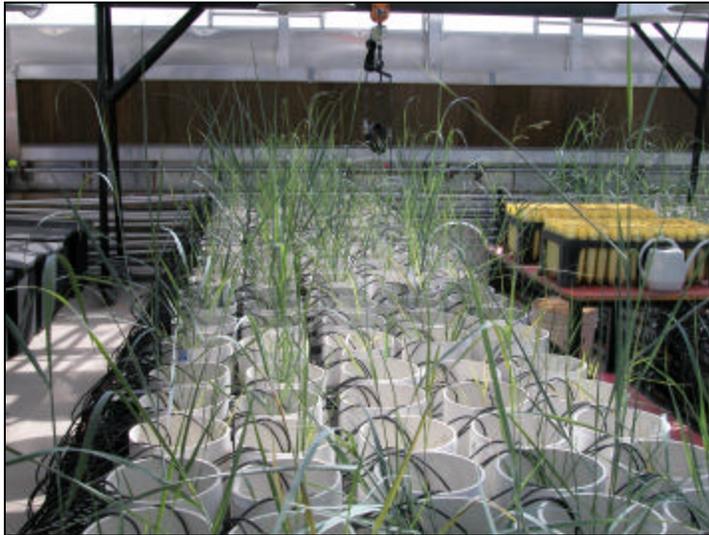
An international team of researchers is in the final phase of a water erosion study at NGPRL that investigated erosion characteristics of converted Conservation Reserve Program (CRP) land. The team, composed of researchers from China, France, Turkey, Germany, and the United States, conducted a sequence of simulated rains on former CRP land in conventionally-tilled and no-till cropped plots, hay production plots, and CRP land tilled multiple times. A manuscript from the study entitled "Runoff, Erosion, and Soil Erodibility on CRP Lands Converted to Crop and Hay Production" is beginning the review process.

Switchgrass as a Bioenergy Feedstock: Its Potential Role in the Northern Great Plains

The Department of Energy (DOE) has been researching ways to reduce our country's dependency on non-renewable, petroleum-based products. Since 1978, the Bioenergy Feedstock Development Program (BFDP) has provided technical leadership for DOE in this area. Located at the Oak Ridge National Laboratory near Oak Ridge, TN, the goal of the BFDP is to establish a biomass supply system capable of supporting a bioenergy industry that is both economically viable and environmentally sound.

In support of this effort, DOE is investigating the development of switchgrass as a bioenergy feedstock. Once an integral part of the tallgrass prairie, switchgrass possesses a wide geographic range of adaptability, thereby making it a viable option as a bioenergy crop. Switchgrass is a warm season species, meaning it does the majority of its growth during the warmest portion of the year - the summer. Although it is a perennial, switchgrass

does not reach full yield capability until about the third year after planting. Once switchgrass is established, relatively few inputs are required to maintain its growth.



Switchgrass at an early stage in the greenhouse.

The NGPRL has been involved in several switchgrass projects since 1999. This work, funded in part by DOE, has been a collaborative effort with other research facilities in the Great Plains region. One of the projects has been to investigate the mineral nutrition requirements for

switchgrass.

Specifically, research is being conducted to determine the nutritional requirements for switchgrass by examining its response to different levels and combinations of nutrients. To carry out the research, a greenhouse bay at NGPRL was renovated to allow switchgrass plants to be fertigated with up to 18 different nutrient levels or combinations simultaneously. Currently, research is focused on three nutrients: nitrogen, calcium, and potassium.

As this is an ongoing project at NGPRL, we hope to be able to provide information to help make switchgrass production in the Northern Great Plains an economically viable option for agricultural producers in the future.

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NGPRL Update

Scientist Receives Award

Dr. Steve Merrill, Soil Scientist at NGPRL, received the 2001 Professional Award from the North Dakota Chapter of the Soil and Water Conservation Society. Dr. Merrill was recognized for his research on wind erosion, crop water use, and root development for cropping systems in the Northern Great Plains.

Personnel

John Bullinger, an Agricultural Research Technician working with Dr. Mark Liebig, retired in Jan. 2002. During John's 32 years of service at NGPRL, he is credited for his excep-

tional field skills in irrigation and cropping systems research, as well as his commitment to safety in the workplace.

Updated Version of 'Crop Sequence Calculator' Released

An updated version of the 'Crop Sequence Calculator' was released in Jan. 2002. Improvements over the first version include additional data, a section on insects (compliments of NDSU), and a review of the dynamic cropping systems concept. The program is designed to help producers assess crop production options for the Northern Great Plains.

We're on the web:

www.mandan.ars.usda.gov

NORTHERN GREAT PLAINS

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PASS IT ON!!!

Feel free to pass on this issue of *Northern Great Plains Integrator* to others interested in agricultural research in the Northern Great Plains.

To be added to our mailing list, request a copy through our website or contact Audrey Myers by phone (701 667-3001), fax (701 667-3054), or e-mail (myersa@mandan.ars.usda.gov).

Summer Field Tour Preview

Expanding Opportunities in Agriculture “Friends and Neighbors Day” and Annual Field Tour Thursday, June 27, 2002

TOPICS of INTEREST

- Crop Sequence Calculator—Version 2.1
- Carbon Sequestration in Prairie Grasslands
- Crop Diversity: Effects on Soil Quality and Water Use
- Annual Forages for Late Summer/Fall Grazing
- Potential Biocontrol for Sclerotinia Disease
- Growing Switchgrass for Biofuel Production
- Grazing Management for Intermediate Wheatgrass
- Turf Management for Home Lawns
- Land Management for Game Birds

SCHEDULE of EVENTS

- 1-7 p.m. (CDT) — Open House
- 3:15 p.m. — Free Registration
- 3:45 p.m. — Field Tour
- 7-8 p.m. — BBQ and Speakers

Sponsored by NGPRL and Area IV SCD
Research Farm.