The Northwest Experiment Station News

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Legislative Concerns

Richard J. Sauer, Vice President for Agriculture, Forestry and Home Economics and Director, Agricultural Experiment Station.

Dear Friends of the Northwest Experiment Station:

Superintendent Larry Smith has offered me the opportunity to use his column to communicate with you regarding our agricultural programs and some challenges we face in the 1987 legislative session. Our faculty and scientists look back with pride on the role our research, teaching, and extension programs have played in the development of Minnesota's agriculture, rural economy and society. Minnesota agriculture is the sixth largest in the U.S. despite some rather overwhelming geographic and climatic odds.

We can reflect on our role over the last century in laying the foundation for the tremendous improvement in Minnesota and U.S. agricultural production. We have literally made two blades of grass grow where one grew before, and this has enabled us to be a major food and fiber exporter. Our technology has helped stave off hunger and starvation via **The Green Revolution** in the third world countries.

We have a productive U.S. agriculture where 2% of the people now produce the food and fiber for the other 98%, with that other 98% producing things of value for an affluent nation. We have the greatest variety of safe and healthful foods available for the smallest part of disposable income anywhere in the world.

But the last 100 years was the easy part. In a sense, today's problems are caused by abundance and success not by shortages and failure. We now have a new reality with which to deal and our incomparably productive agricultural system has developed cracks. The list would keep you awake at night: gutted soils and heavy silting; increased flooding; alarming depletion of aquifers; disturbing pervasiveness of chemicals; run-off pollution; wholesale resistance to pesticides by insects and weeds; scarce water used for producing costly agricultural surpluses for which there is sometimes an insufficient market; farm policies that favor production for production's sake and declining farm exports.

There is also a new force loose on the land. There is a burgeoning consumerism with a health and fitness movement and a lifestyle change. There is a change in diet preference, dominated by the role diet plays in chronic diseases and maintaining health. Concerns about cholesterol and red meat and calcium in milk are but two examples.

There is a turmoil in what we eat, who we eat with, how we shop, where we buy, how we cook and how we don't cook. The home where dad works and mom is at home with the kids is now less than 10% of U.S. households. There are 1,095 "three-square-meals" a year. But in the last five years, on the average, we ate 140 fewer of those meals at home. Public emphasis has shifted from growing two blades of grass to what will take two minutes in the microwave to prepare and will make you feel better and live longer.

What's ahead? There will be more emphasis on new crops, new uses, and more value-added products. There will be more emphasis on alternative opportunities for farmers. There will be a focus on creating off-farm jobs for farm families and stimulating economic diversification of rural communities. There are gathering clouds of confrontation. Pressures of competing demands for resource use may, in some cases, actually decrease productivity and increase farmer's costs. The competition for water use is an example.

Farm lifestyle and farm changes won't stop at the farm gate. Farm families, farm practices and farm economics are intertwined with the rural community. Changes in agriculture effect the economic, social patterns and stability of rural areas. Urban areas and residents spill into rural areas and farming neighborhoods bringing new pressures, perspectives and problems of coexistence. In 1920, there were more urban than rural people in the U.S. for the first time. In 1935 farm numbers hit their peak. Today more people than ever before live in rural areas. Rural non-farm people outnumber farm dwellers ten to one. Such changes create a challenge for the research and education programs of the University of Minnesota and other land-grant universities.

(continued on page 2)

Sauer continued

Amidst the surpluses and low prices, I increasingly hear the suggestion that perhaps we should slow down our science and technology development. Some have even suggested a moratorium so that society has a chance to assimilate the gains we have made. Whenever I hear such suggestions, I am reminded of the old French proverb which when translated goes like this: "Ah, for the good old days, when we were so unhappy." I believe such reasoning is seriously flawed and if anyone believes that the solution to our problems in agriculture is reducing our production efficiency, one only need look at automobiles, steel, textiles and other old-line manufacturing industries that have not maintained their international competitiveness.

In short, with the need to keep our agriculture competitive and with the array of new problems and challenges we face, I'd argue that a public investment in agricultural research and educational programs is more important than ever. This is where we need your help!

The budget requests for both the Minnesota Agricultural Experiment Station and the Minnesota Extension Service are handled as part of the total University budget process, however, each of the items is handled as a separate state special appropriation. That means that these two line items are being addressed individually by the legislature and, in that sense, have some autonomy within the overall University budget. We do have very good support from the President and the Board of Regents in submitting requests for increased program funding for the next biennium. The amount being requsted in this session is $1,392,500 per year of the biennium for the Extension Service and $2,360,000 per year for the Agricultural Experiment Station. These requests approximate a 10% increase over the current funding for each of the programs.

As was indicated in **The Press** in February, Governor Perpich's budget recommendations placed a high priority on higher education including the University of Minnesota and its program of **Commitment to Focus** of which we are very supportive. While that support is helpful to our two agricultural specials indirectly, the Governor's overall recommendations do not favor us as well. He has no made recommendations for increase to either the Extension Service or the Experiment Station's new priority requests. The only proposed increase is an annual appropriation of $515,000 to continue the role of the Extension Service in the Farm Credit Mediation Program. This would be funding to continue the program during the next biennium, a program that we did not request and is not part of our biennial plan, though we have played an important role in implementing the program across the state.

In addition, the Governor has recommended that the total funding for state special appropriations to the University be reduced by $3 million per year during the next biennium. As our two specials comprise about 50% of the total state special funding, that proposed cut would reduce the Experiment Station budget by $1 million annually and the Extension Service budget by $500,000 annually, if shared proportionately.

If you feel strongly about the value of our programs and that current funding levels should continue, along with serious consideration of our requests for increases, I would ask you to contact your legislator **immediately.** Legislative committees will begin to mark up University appropriations in the next couple of weeks. Your input could mean the difference in our maintaining research and education programs to your benefit. These programs are your programs and our role is to help you live and make a living, but we need continued state support during these troubled times in order to fulfill our role. Thanks for any help you can give at this time.

Calendar of Events

NWES Advisory Committee
April 7

UMC Commencement
May 22

NWSA Alumni Reunion
June 27

Crops and Soils Day
July 15

Sheep Day
October

Beef Cattlemen's Institute
October

Beef Day
December

Happy Easter

Think Summer!

What Happens With Intensive Fertilizer Management on Spring Wheat?

by John Lamb, Soil Scientist

In the past five years a large amount of information on the intensive management of inputs on small grains has been reported from Europe and the eastern United States. These practices emphasize the use of several different fertilization practices such as high yield goals, starter, and foliar application of N. These practices have proven to be effective in increasing yields and protein content in these areas. Little data exists for the effectiveness of these practices on spring wheat grown in the soil and atmospheric environments similar to those found in northwestern Minnesota and eastern North Dakota. With this in mind, a study was started in 1985 at the Northwest Experiment Station to evaluate: 1) if these intensive fertilization practices will increase spring wheat grain yield and quality, 2) if there was an increase in yield and quality, what practice or combination of practices were effective, and 3) what effect does the use of intensive fertilization practices have on the residual soil fertility.

This study has been conducted in 1985 and 1986 and will be concluded after the 1987 cropping season. The treatments involved are: 1) preplant fertility for two yield goals (60 and 110 bushels/A), 2) starter fertilizer (0 or 100 #/A 18-46-0 in 1985 and 180 #/A 10-34-0 in 1986), 3) foliar N applied at flag leaf (0, and 15 # N/A as Urea dissolved in water), and 4) two applications of fungicide (0, or 2 #/A M-45).

In the two years we have conducted this study, we have had two different weather and growing conditions. In 1985 the potential for high yields was present. The growing season had adequate moisture and temperatures, low disease pressure, early planting date (May 2, 1985) and a long grain fill period. The growing season in 1986 did not have as great yield potential because of early wet weather, dry weather in July, and disease pressure caused by leaf rust, scab, and leaf disease.

The 1986 planting date was May 5. Marshall wheat was used both years because of its short stature which reduces lodging, and the large number of acres it occupies in the spring wheat production areas of Minnesota and North Dakota. The soil tests for 1985 and 1986 are listed in Table 1. From the soil test information, the appropriate amounts of preplant fertilizer was applied to obtain the 60 and 110 bu/A yield goals (Table 2).

Well, what did we find? In both years grain yield and protein were increased with increased preplant fertility (Table 3). Grain yields in 1985 were increased by 8% while in 1986 the increase was not as large, 3%. The protein content was increased 1% and 0.6% in 1985 and 1986, respectively. Grain yields and protein are not directly related. The wheat will use N for increasing grain yield first before translocation into the grain to increase protein content. Because of the larger grain yields in 1985 when compared to 1986, the protein content was less on the average in 1985 when compared to 1986. The additional fertilization from 60 bu/A to 110 bu/A yield goal also cause a larger increase in protein content in 1985.

TABLE 1. Spring soil tests for intensive management study, Northwest Experiment Station, 1985 and 1986.

	Spring, 1985 Yield Goal	Spring, 1986 Yield Goal	
	All Plots	60	110
OM %	3.1	2.7	2.7
NO_3^--N (0-24")	96	40	143
P (0-6")	8	22	30
K (0-6")	320	270	325
pH (0-6")	8.2	8.2	8.2
Salts (0-6")	0.3	0.3	0.3

TABLE 2. The quantity of preplant fertilizer applied for intensive management study, Northwest Experiment Station, 1985 and 1986.

	1985 Yield Goal		1986 Yield Goal	
	60	110	60	110
	---lbs/A--		---lbs/A--	
N	25	150	80	102
P_2O_5	70	100	30	30
K_2O	0	50	30	50

Table 3. The effect of yield goal (preplant fertilization) on grain yield, protein, and test weight.

Yield Goal	Yield bu/A		Protein %		Test Weight #/bu	
bu/A	1985	1986	1985	1986	1985	1986
60	77.2	66.5	12.8	15.2	58.9	59.8
110	83.4	68.8	13.7	15.8	56.8	59.4

(continued next page)

Along the same line, in 1985 the addition of 15 # N/A as a foliar spray at flag leaf stage increased the grain yield at the 60 bu/A yield goal (Table 4). This did not occur at the 110 bushel yield goal in 1985, nor at either yield goal in 1986. Normally, you would not expect grain yield increase from foliar spray at flag leaf because most of the N for plant growth has been taken up by the plant at that stage of growth. The longer grain fill period of 1985 may explain why this occured. The protein levels were not effected by foliar N application in either year.

Table 5 lists the effects of fungicide and yield goal on grain yield and protein in 1985 and 1986. This data suggests that when the nutrient status is at optimum or above optimum, the application of fungicide to decrease the loss of grain yield from disease is advantageous. If the nutrient status is below optimum, there is no benefit from fungicide application. Other studies have shown that increased soil fertility status, particularly N, increased the plant growth and increased the incidence of disease. The 110 bu/A yield goal in both years have had larger grain yields when fungicide has been applied than where no fungicide has been applied. The 60 yield goal has not shown this response.

The use of starter fertilizer did not influence grain yield or protein content in either year.

How is the residual soil nutrient status influenced by the increased addition of fertilizer? Table 1 indicates an increase in soil test $NO3^-$-N and P from fertilizer applied to meet a 110 bu/A yield goal. Even with the resultant increased grain yield, the crop did not use all the nutrients supplied. The $NO3^-$-N content on the 0-24" depth was 100# $NO3^-$-N/A greater in the 110 bu/A yield goal plots when compared to the 60 bu/A yield goal in the spring, 1986 soil test. The $NO\ 3^-$ -N content was decreased in the 60 bu/A yield goal plot but increased in the 110 bu/A yield goal when compared to the 1985 soil test. The phosphorus content was increased for both yield goals when compared to the original soil test in spring 1985. The 110 bu/A yield goal fertilization increased the soil test P more than the 60 bu/A yield goal. The potassium soil test was not effected significantly. These increased soil test levels indicate there are some consequences to a producer's soil fertility management from using high fertilizer inputs. If a producer is raising sugarbeets or malting barley in rotation with spring wheat, with additional N could hurt the quality of the crop. This makes the need for a soil test more important than ever.

In summary, the following conclusions can be drawn in the first two years of this study:

1. Increasing preplant N fertilization will increase grain yield and protein
2. Setting a realistic yield goal is important.
3. Addition of starter fertilizer did not effect yield or quality.
4. If an N deficient situation exists, the addition of N by foliar spray at flag leaf stage can increase yield.
5. If you are at optimum or above soil fertility, the use of a fungicide may be necessary.
6. Excess fertilizer use will increase the soil test values and may influence the future management of soil fertility.

TABLE 4. Effect of foliar N and yield goal on grain yields and protein in 1985 and 1986.

	Yield bu/A				Protein %			
	1985		1986		1985		1986	
	foliar #/A							
Yield Goal bu/A	0	15	0	15	0	15	0	15
60	74.8	79.9	66.3	66.7	12.8	12.7	15.2	15.2
110	84.4	82.6	69.4	68.3	13.6	13.8	15.7	15.8

TABLE 5. The effect of fungicide and yield goal on grain yield and protein in 1985 and 1986.

	Yield bu/A				Protein %			
	1985		1986		1985		1986	
	fungicide #/A							
Yield Goal bu/A	0	2	0	2	0	2	0	2
60	78.4	76.0	67.7	65.3	12.9	12.7	15.3	15.1
110	80.6	86.3	66.0	71.6	13.7	13.8	15.7	15.8

Carlson Named Employee of the Year

Earl Carlson, general maintenance supervisor at the Northwest Experiment Station, is pictured with his wife, Christine, and his son, John, receiving the First Annual Northwest Experiment Station Employee of the Year Award.

Earl joined the maintenance crew of the Northwest School of Agriculture and Experiment Station in 1964. With the separation of the maintenance department between the College and the Experiment Station in the early 70's, Earl assumed the supervision of the Experiment Station maintenance department and is responsible for all maintenance and construction supervision on the Experiment Station.

Earl was chosen as the first recipient because of his positive attitude toward his work and fellow employees, his attention to details and his imagination - which has led to the construction of many pieces of equipment needed in research and not available in the market place. Earl has donated countless hours supervising and inspecting the construction of the new dairy research and education facility, Ag Research auditorium and office remodeling, and responding to problems that always arise on weekends, especially when the temperature is -20°F.

The Employee of the Year Award was designed to promote and recognize excellence in job performance among Civil Service and Bargaining Unit personnel. Funds for this award come from a President's Club donation designated for this purpose.

Congratulations to a most deserving employee.

Herman & Jerome Retire

Herman Gilbertson started working at the Northwest School of Agriculture and Experiment Station on November 10, 1952. Gilbertson worked in a herdsman capacity for three superintendents - Tom McCall, Bernie Youngquist, and Larry Smith.

Herman's early assignment was in poultry research under the direction of A.M. Pilkey. when the poultry research was discontinued, Herman was transferred to the beef and sheep project.

Herman and his wife, Myrtie, were honored at a retirement party on January 5, on the occasion of Herman's retirement. Herman and Myrtie plan to remain in Crookston and take life a little easier.

The staff of the Northwest Experiment Station wishes Herman and Myrtie the best of health and happiness on their retirement.

Lawrence (Jerome) Sirek, senior farm animal technician, and his wife, Joanne, are pictured on the occasion of Jerome's retirement after 35 years of service.

Jerome started at the Northwest School of Agriculture and Experiment Station on September 6, 1951. In the early years he worked primarily with the regional swine projects under the leadership of Dr. Homer Fausch, Dr. Diedrich Reimer and Dr. Harvey Windels . Sirek was involved in the fat-back probe work with swine and helped develop the crates and other equipment necessary for the swine project until it was discontinued in 1969.

Jerome was the lead technician for several years in the sheep breeding program involving crosses of Targhee, Suffolk and Columbia sheep and with the latest research project involving crosses of Finn, Targhee and Suffolk breeds under the direction of Dr. Harvey Windels.

Jerome and Joanne have moved to Annandale, Minnesota where Jerome intends to spend some his time chasing fish, not sheep.

The Northwest Experiment Station staff wish Jerome and Joanne a long and happy retirement.

Wildlife Values of Single-Row Shelterbelts

by Dan Svedarsky

A two-year study has been completed at the Northwest Experiment Station to document wildlife use of different types of single-row windbreaks in the Red River Valley. Wildlife values are often mentioned as a benefit of windbreak plantings but very little data had been available. Windbreak types were evaluated for summer bird use from late May to early July with incidental use by mammals also noted.

Birds may use windbreaks for attaching nests, singing perches, a food source and as a resting and feeding place in the case of migrating birds. Windbreak types studied were: green ash, Siberian elm, hybrid poplar and cottonwood. Lower branches of windbreaks are commonly pruned to allow a more even distribution of snow downwind and the effect of this practice on bird use was also evaluated.

Thirty-one species were regularly observed during the study with 15 species nesting in at least one windbreak type. The most common species observed were: vesper sparrows, red-winged blackbirds, brown-headed cowbirds, American goldfinches, robins, mourning doves, eastern kingbirds, clay-colored sparrows, northern orioles and bobolinks. Some windbreak types were more attractive to birds than others and they are arranged according to increasing bird use in Figure 1. Siberian elm was the most attractive type, especially if it had not been pruned. Pruning removes lower, more horizontally-oriented branches which are used for nest placement by birds such as robins, and mourning doves. Pruning also allows farm machinery to work closer to trees and this results in less ground vegetation habitiat than an unpruned windbreak. Siberian elms were also important as a food source since they typically supported large numbers of fall cankerworms. Birds from farmstead shelterbelts were commonly observed feeding on cankerworms in windbreaks.

Tree height was also a factor influencing bird use since birds such as orioles generally attach their hanging nests to branches of trees over 30 feet high. The crops adjacent to a windbreak explained the occurrence of species like clay-colored sparrows and bobolinks which nested in the ground cover. Small grain and alfalfa provided more cover than row crops.

A surprising amount of deer sign was noted to be associated with windbreaks. Fresh tracks were noted on 30% of the census visits and these tended to parallel windbreaks, indicating that windbreaks were being used as travel cover. A network of single-row winbreaks in the intensively-farmed Red River Valley probably increases the summer use of larger farmstead shelterbelts as deer fawning area due to this travel cover value. Moose, fox, rabbit and other mammal use was noted as well.

In summary, single-row windbreaks do have significant wildlife values in an intensively-farmed landscape. Siberian elm was the most attractive tree species evaluated due to its food and cover values. More green ash and poplar windbreaks are currently being planted and, while not as attractive to summer birds, they tend to require less maintenance by pruning than elm and this trend will likely continue. To maximize wildlife values of windbreaks, the height and width of tree cover needs to be increased. Double tree rows are sometimes planted to further increase wildlife use.

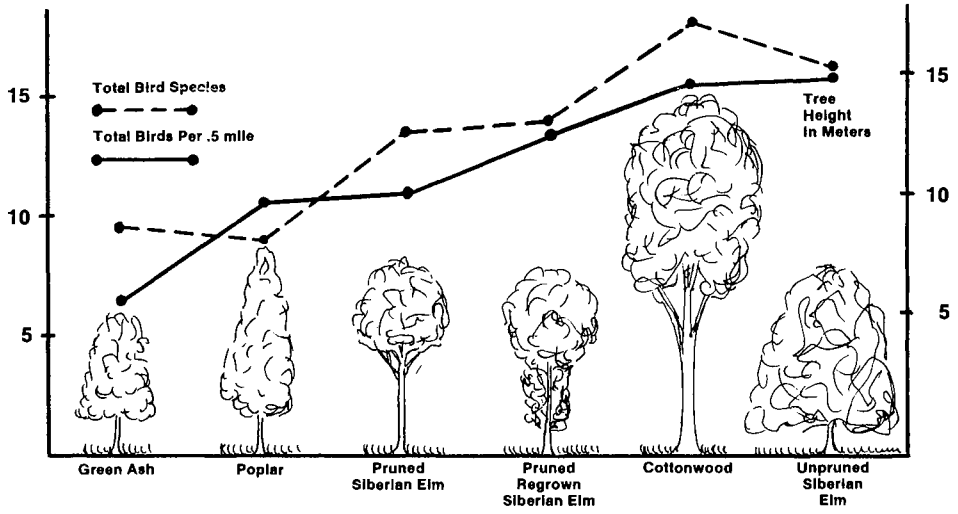

Fig. 1 TOTAL BIRDS & SPECIES DIVERSITY PER WINDBREAK TYPE

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