MINNESOTA
Science
Agricultural Experiment Station
University of Minnesota
Winter, 1990

Sizing is Unreal! So Why is Nobody Surprised?

Same size jeans usually aren't! Only 8 percent of 240 jeans measured were found to be sized accurately by researcher Wanda Sieben of the College of Human Ecology.

It can be a hassle. How many of us are sufficiently brave or foolish to buy jeans without first trying them on?

"Try telling a 15-year-old to take three pairs of jeans of different sizes into the dressing room when he doesn't want to be there in the first place," suggests Wanda Sieben, a Minnesota Agricultural Experiment Station apparel quality researcher. "Worse yet, try buying jeans for someone who isn't along."

Sieben recently evaluated the accuracy of size labels. What she found, in measuring 240 pairs of men's five-pocket, prewashed jeans and comparing actual measurements with labeled sizes, would probably not surprise many people. Stated inseam and waist sizes often differed significantly from actual measurements.

She studied nine brands of jeans—two national and one private label in each of three price ranges: low ($24.99 or less), medium ($25.00-39.99) and high ($40.00 or more). Sieben considered an actual dimension to be the same as stated if the two did not differ by more than a half-inch.

"In some instances," says Sieben, "there was quite a bit of difference between the size on the label and the actual size; a waist labeled 32 inches might actually measure 34." The greatest discrepancy Sieben found at the waist was 2½ inches; at the inseam, 4 inches. Only 18 of the 240 pairs—about 8 percent—met the half-inch tolerance she allowed at waist, right and left inseam measurements.

And more expensive jeans aren't necessarily more accurately sized. Sieben found that, while higher priced jeans were more likely to match the stated inseam size, lower-priced jeans were more likely to be the stated waist size. Also, private label jeans were more likely to have size discrepancies at the inseams than national brands.

"Many factors can affect the final dimensions," says Sieben. "But in the final analysis, the size labels on the jeans we measured would *not* have served as useful guides for making an informed buying decision.

"Consumers just seem to assume that jeans manufacturers use the best techniques for optimal quality control, which is, in reality, rarely the case. Consumers are the ones who find out that the sizes on the labels often don't reflect reality. Unfortunately, they're also the ones who most often pay the price—in dollars, time, frustration and inconvenience—for this poor quality control."

Sieben says she hopes her research helps validate consumers' experiences and leads them to act on their own behalf. "One defense that manufacturers fall back on is a lack of feedback from consumers regarding the quality of their products. Inaccurate labeling persists partly because consumers do not complain enough about it."

Sieben also hopes her study will convince manufacturers to improve quality control. They have everything to gain by accurately labeling for size, she says. Doing so can only increase consumer confidence in their products.

—Sam Brungardt

MINNESOTA Science

Soybean Nematode Spread Under Attack

A battle to control soybean cyst nematode is under way. It's a battle to control a microscopic worm that grows on soybean roots and stunts growth.

The first Minnesota outbreak was found near Waseca in 1978. It has since spread to 23 southern Minnesota counties. Minnesota Extension Service plant pathologist Ward Stienstra says, "Since 1979 we've been telling people to expect it. In the dry year of 1989, people became believers. It took off all over the place."

The battle has been joined from two directions. Stienstra is documenting rotation effects and other crop management controls. Experiment station plant pathologist William MacDonald and soybean breeder Jim Orf, are screening new soybean lines for resistance.

In 1989 the nematode reduced yields up to 64 percent in some fields. "It's a major limiting factor for soybeans," Stienstra says. Farmers need to recognize the problem, document it and calculate its economic effect, he says.

The researchers are funded by the Minnesota Soybean Research and Promotion Council and the experiment station. A descriptive brochure is available from the Council at: PO Box 2026, North Mankato, MN 56002.

—Dave Hansen

Minnesota "Ecotones" Ideal for Climate Research

Greenhouse effect! Ozone depletion! Global warming! Open a newspaper or flip on the television news, and you'll likely run into one of these red-flag phrases. They flag changes to the chemical makeup of the air around us. They flag changes due to human action.

Heat-trapping molecules of carbon dioxide and methane, "greenhouse gases," are building up from industrial and biological activities. Ozone, a gas that absorbs harmful ultraviolet rays from the sun, is being destroyed by chlorofluorocarbons floating skyward from spray cans, refrigerants, and other modern conveniences.

Change in the water table is one of the first symptoms of altered climate.

The gases are changing our atmosphere. And, it's uncertain what this change means for the life beneath it, according to experiment station environmental scientist and plant pathologist Sagar Krupa.

"The jury is still out," says Krupa, an internationally recognized expert on environmental effects of air pollution.

Because the chemical, physical, and biological processes of air and earth are intricately entwined, there are few direct cause-and-effect relationships. The condition leads to computer model predictions that run from annihilation of life to only minor changes in weather.

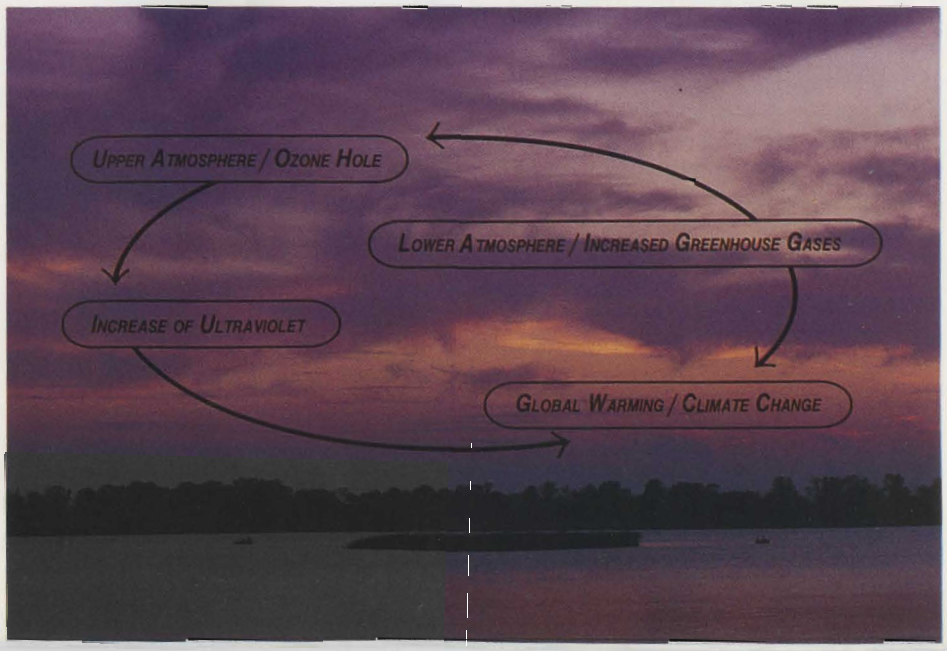
Krupa initiated the formation of an interdisciplinary University task force to improve our picture of what we are doing to our atmosphere. The group includes experts from a range of specialties including plant biology, climatology, ecology, and systems analysis.

Department of Plant Pathology head Philip Larsen says Krupa was "instrumental in getting the group together, in identifying individuals across the clearer picture of the effect of shifts in the chemical makeup of air. He says it should provide a clearer picture than that possible from computer models.

"Computer systems and models can only work with what you give them," he points out. "If in the first place you didn't put in the right information or complete information, they won't give you the correct answer."

Minnesota is an ideal place for investigating the climate change issue, Krupa says. The state has unique and abundant narrow "ecotones."

Ecotones are transition zones between different kinds of ecosystems such as wetland and upland, or prairie and forest. Ecosystems often are delineated by the water table, and a change in the water table is one of the first symptoms of altered climate. Krupa claims that a



"Common" Tern Anything But

The common tern is anything but a common bird to university researcher Francesca Cuthbert. The current Minnesota population of about 600 pairs, is down two-thirds since the 1930s. Their

provided secure, safe nesting sites away from human activity and competing ring-billed gulls," explains research assistant William Penning. "We created a 4½-acre sandy island by cutting trees

numbers declined dramatically through most of the 1980s. However, in 1989 the population began to recover due to creative habitat improvements.

In 1988 Cuthbert predicted that without change, "few of the Minnesota colonies will exist beyond the year 2000." The common tern was placed on the "Special Concern" list in 1984 by the Minnesota Department of Natural Resources. Neighboring Great Lakes states list it as endangered or threatened.

Gull Island in Leech Lake is home to Minnesota's major colony, making up about half the state's population. Other colonies are in Duluth Harbor, Mille Lacs Lake, Lake Kabetogama and Lake of the Woods.

Cuthbert specializes in shorebird research for the Minnesota Agricultural Experiment Station. She says the Duluth tern population decreased alarmingly, from 198 breeding pairs in 1983 to only 88 in 1988. "Basically all the young terns died," Cuthbert says. "Parents were nesting in districts around the port where there was shipping activity, hiking, pets and other predators."

The 1990 Duluth census found 124 pairs, a seventy percent increase. "We

Common terns forced to nest near human development could not successfully reproduce. The birds have been attracted to a protected nesting area on Interstate Island in the St. Louis River estuary.

and scraping vegetation off. The terns think its great!"

Ring-billed gulls are a major problem facing common terns throughout the Great Lakes. The gulls are newcomers, adapted to developed shoreline areas. They arrive about a month earlier than terns and take the best nesting sites. Terns are forced to alternatives often more susceptible to predators, or too close to human activity.

Cuthbert and Penning tried several tactics to improve nesting success of Duluth's common terns. Volunteers patrolled the areas at critical times, and decoys of great horned owls with gull carcasses in the owl's talons were used to make terns think twice about landing at poor nesting sites.

Improved nesting sites away from human disturbances were prepared, including two islands in the St. Louis River estuary. The Minnesota and Wisconsin DNRs worked closely with the researchers. Predators were controlled, or kept out by electric fences. "We attracted the terns to the good sites with decoys and by playing tapes," Cuthbert says.

Finally in 1988 the terns were completely kept away from the undesirable nesting sites. However, severe storms destroyed their nests in the exposed sand at their new Wisconsin Point home.

"The number one thing we can do is provide good, safe habitat," Cuthbert says, "and this year our efforts were successful." Penning says that in 1990, "all of the birds automatically went to Interstate Island, the improved site. There, 168 chicks survived. We have high hopes for the Wisconsin Point site also."

Minnesota's DNR and the Agricultural Experiment Station support Cuthbert's research of shorebird species including the sandhill crane, piping plover and burrowing owl. She also studies the threatened Blanding's turtle.

—Dave Hansen

Even relatively pristine locales are not immune from climate changes. People are affecting our atmosphere with byproducts of human activities leading to more ultraviolet radiation reaching the earth's surface, and general global warming.

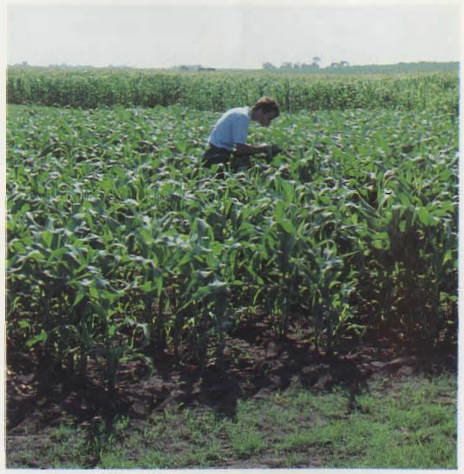
Twin Cities campus who can add important parts to this whole picture." The mix of specialties will help the group initiate new approaches to research and to ways of understanding the problems.

The group is trying to develop an experiment to mimic atmospheric changes. It will release carbon dioxide or ozone or change the moisture of the system, and allow them to watch what happens. Krupa says it will give a shift would first appear in such ecotones.

The research group hopes to get a boost from the U.S. Environmental Protection Agency. It's seeking designation for the University as one of four national environmental research centers. If the group's proposal is selected, they will be guaranteed at least five years of funding to pursue an answer to the puzzle of global atmospheric change.

—Mary Hoff

Soil and Sludge May Be Good Combo



Feed corn fertilized with wastewater treatment plant sludge shows no problems with heavy metals moving up the food chain.

Sludge ash! It's a powdery brown byproduct of wastewater treatment. And right now, it's not exactly what people are breaking down doors to get.

A Minnesota firm wants to change that. It wants to convince farmers that sludge is just the thing they need for well-fed crops, and for a chance to help with society's growing waste disposal problem, too.

A Minnesota hauling company, Rehbein, is treating farmland with an ash based soil conditioner as a way to dispose of the waste and improve crops at the same time. Watching the project closely is experiment station soil scientist Carl Rosen.

Rosen has monitored the effect of sludge ash on crops in experimental plots for four years in Westport, Minn.

"After four years, we can say that the ash does contain nutrients that can be beneficial to plants if those nutrients are deficient in the soil," Rosen says. "You are going to increase the concentration of heavy metals in the soil, because they're in the ash," he says. "But we feel that at the ash rates applied the metal loading should not be a problem."

Sludge ash disposal is a relatively new problem. Ironically, it's a byproduct of efforts to clean the environment. Years ago, cities sent nutrient rich wastewater right into lakes and rivers, often turning them green with weeds and algae.

Sludge *continues on p. 3*

MINNESOTA Science

Integrated Controls Fight Sugarbeet Diseases

Carol Windels is a unique researcher. She spends her time with plant pathogens in labs and sugarbeet fields in Crookston, the Red River Valley and west central Minnesota. She's the only professional plant pathologist based at a branch of the Minnesota Agricultural Experiment Station.

Windels has been at the Northwest Experiment Station at Crookston for six years, working on diseases endemic to the Red River Valley, and particularly on problems associated with sugarbeet stand establishment. "The previous common view was that wind, insects and seed bed preparation were important. Most producers didn't consider plant diseases, but we've found that diseases are one factor of the stand establishment problem," she says.

"I was working with one grower in 1986 who had not planted a field to sugarbeet in ten years, but he still had problems." She says that's because plant pathogens can be very persistent. Some can lay dormant in the soil for years, until proper conditions are present—say wet weather and an appropriate host for a water loving fungus.

Clientele are progressive and ready to implement the latest research results.

Windels' research focuses on developing integrated controls for soil borne diseases of sugarbeet. This in-

Annual field day visitors at the Northwest Experiment Station, Crookston, are eager for the information Carol Windels provides on sugarbeet and rotation crop disease identification and control strategies.

her attention as common rotation crops.

Windels' work has contributed to stabilizing several areas of the region which were poised to experience severe production losses from the spread of pathogens.

Working with other University researchers, she's had one particular success in slowing the spread of a pathogen responsible for sugarbeet root rot. That was in 1988, when the practice of returning tare soil to fields was discontinued at the Southern Minnesota Beet Sugar Cooperative in Renville. Tare soil is now disposed of at designated sites where it won't be able to spread the pathogen to acreage previously not infected.

Tare soil is the field residue that is

clientele are progressive and ready to implement the latest research results into their operations," she notes.

Because of the effects of recent years' droughts, it's difficult to estimate a dollar value for her work to the industry, but she says, "I do know that we have much more grower awareness of disease problems, what to look for, and better cultural methods based on having more knowledge of plant diseases."

In fact, the industry funds most of her research through its annual checkoff program, and growers provide ready access to their fields when research sampling requires.

—Larry Etkin

Sludge *continues from p. 2*

Clean water laws spawned treatment plants to remove most wastewater nutrients. This improved water quality, but also created mountains of nutrient loaded sludge. In Minnesota, most sludge is burned, producing thousands of tons of ash annually. Almost all is currently dumped into landfills.

Rehbein aims to put the phosphorus rich sludge to good use. It will mix it with waste lime from water treatment plants, and offer it free of charge to farmers as a soil amendment. It will cost farmers nothing because the ash producer pays Rehbein to dispose of the wastes.

The project is experimental. Rosen and Minnesota Pollution Control Agency staff will be watching for potential negative effects.

Their concern is about metals such as lead and cadmium found in sludge ash. These metals can sometimes be taken up by plants grown on the ash, potentially posing a health risk to animals, including people, that later eat them.

Rosen's past field research shows no such uptake with corn. But studies of container grown lettuce suggest that metals may be taken up by leafy plants when ash is applied at high rates. That's why Rosen will monitor the soil and plants in ash treated areas to see if—and how—the metals travel.

"No matter how you look at it, there's some kind of risk," Rosen says. "You have to manage waste in some way. The ash is already there. We can either landfill it and wait for a problem or spread it on cropland in rates that we don't think will be a problem. This is a viable alternative to just throwing it away."

—Mary Hoff

varieties, effective and safe chemicals, sanitary improvements in processing techniques, green plant residues and rotation effects.

Because sugarbeets must be grown on a three to five year rotation, she also looks at the interactions of other crops on disease cycles. Small grains, particularly barley and wheat, command

piled at receiving stations. It can carry the fungus *Aphanomyces cochlioides,* which is not yet widespread, but for which no chemical controls are available.

What made that development exciting for Windels was the speed with which the industry adopted the new disposal recommendations. ''The

Locally Produced Ingredients Work Well in Fish Rations

Yousria Ibrahim tests the water solubility of fish rations produced from wheat flour and soybean meal.

Minnesota wheat and soybean growers may help feed the world's population in a new way: by providing less expensive feed for fish farms.

Experiment station food scientist William Breene and cereal chemist Yousria Ibrahim found that flour and gluten from hard red spring wheat work well as binders and sources of nutrients in aquaculture rations. They also demonstrated that soybean meal can be partially substituted for more expensive fish meal in rations.

The U.S. aquaculture industry uses about 1.3 billion pounds of domestic grain products per year. The demand is expected to jump to 4.5 billion pounds by the year 2000. It ''could create larger markets for the hard red spring wheat and soybeans we grow in Minnesota,'' Breene observes.

Wheat gluten's adhesive properties bind the fish food pellets. Gluten doesn't dissolve in water, reducing pellet breakdown and giving pellets the chewy texture that fish prefer.

The researchers also formulated a diet that contained 42 percent high protein flour, 35 percent soybean meal, and 15 percent carp meal. Their product was the least expensive feed possible using locally produced ingredients.

''Soybean meal can be substituted for part of the fish meal,'' Breene says. ''That's good news, because it's another use for oilseed meal and because it's possible to effect some cost savings.''

''This local, cheap diet performed quite well despite the fact that it is not quite as stable,'' Ibrahim adds.

The project was supported by the Greater Minnesota Corporation, the Minnesota Wheat Research and Promotion Council, and Buhler, Inc., a Minneapolis manufacturer of extruders.

—Sam Brungardt

Aspen-Larch Project Seeks Better Tree For Paper Industry

Egon Humenberger shows off one of the aspen/larch project's triploid hybrids. The tree is only midway through its second growing season.

Are we in danger of outstripping the renewability of our forests? Many say we're cutting timber down faster than it grows back. But jobs and our environment require avoiding that problem.

Potential solutions include developing ''super trees'' that grow bigger faster, or to improve the way we grow our trees on plantations. The Minnesota Agricultural Experiment Station has a major role in achieving those goals.

Wood product uses in the Minnesota region are mainly for the production of paper and flakeboard. Aspen is a major raw material, and it's being harvested heavily. It's about 40 percent of the region's—and virtually all of Minnesota's—hardwood harvest. Forest resource managers accept the likelihood of a ''maturity gap'' occurring between harvestable crops in a few decades.

Super trees might fill that gap.

A single European tree has been the aspen breeding workhorse. That may soon change through efforts of an aspen/larch project at the Grand Rapids branch experiment station.

That parent tree, discovered in a Swedish forest 60 years ago, is unique. It has four sets of chromosomes which contribute to increased fiber length and superior growth. It has been widely crossed with normal females of related species to create vigorous triploids for further selection and breeding trials.

But, ''the genetic base is a little narrow with the triploid,'' says aspen-larch project manager Gary Wyckoff. ''Not that we've got any numbers out

Aspen *continues on back page*

MINNESOTA Science

Poast-Tolerant Corn Yields Unexpected Payoffs

Don Wyse and Dave Somers hope their Poast-tolerant corn will do more than give farmers groundwater contamination reducing weed control options.

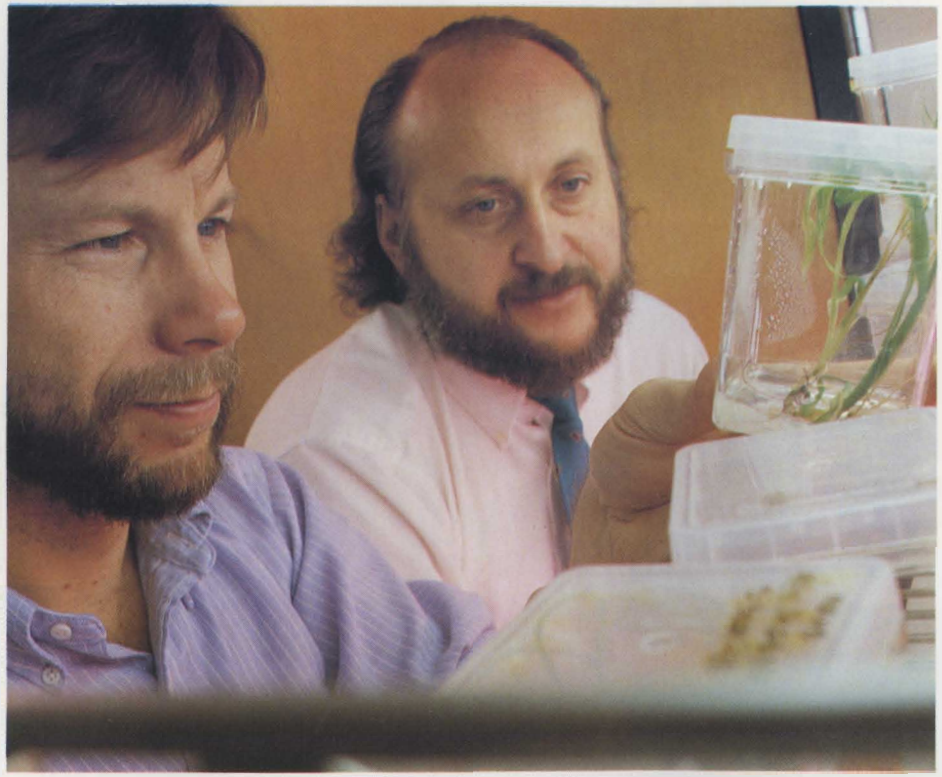
Wyse, a weed scientist, explains that incorporating the mutant line's genetic tolerance to sethoxydim into commercial hybrids will allow farmers to use Poast instead of preemergence herbicides, such as atrazine, to control grassy weeds. That would be good because Poast decomposes quickly. Atrazine and similar herbicides persist in the soil through the growing season, long enough to leach down to groundwater.

Corn growers routinely apply preemergence herbicides to control broadleaf and grassy weeds. If this does not control all the weeds, they may apply another herbicide postemergent.

Why do they routinely apply preemergent herbicides? Because they have few other options for controlling grassy weeds such as foxtail. Few herbicides are registered for postemergent control in corn.

Unfortunately, mechanical weed control, though less costly than herbicides, is an option only about five years in 10, says Wyse. ''Farmers are unwilling to not use preemergence her-

The herbicide inhibits an enzyme, stopping fatty acid production.



Dave Somers (left), Don Wyse and a Poast-tolerant seedling grown from a single cell cultured in the laboratory. Culturing single cells and growing plants from them in this manner is a laboratory procedure that accelerates finding beneficial mutations. This technology is also being used in experiment station laboratories to develop tolerant grasses.

sethoxydim-tolerant corn cells in a laboratory. From these mutant cells, they regenerated plants that produced seed for the herbicide tolerant corn line.

''The university is seeking a patent on the line to exercise some control over how commercial hybrids are developed,'' says Somers. ''BASF, the company that manufactures Poast, has been licensed to distribute the germplasm to corn breeding companies.'' Development of commercial hybrids will

Seed Producers Need Herbicide Tolerance

Having no postemergent to control grassy weeds is also a problem in northwestern Minnesota, where farmers produce lawn and forage grass seed on about 55,000 acres.

''They have no herbicides that will control quackgrass selectively,'' Don Wyse says. ''Right now, grass seed producers get their fields as clean as

In Print

Reed canarygrass' reputation as a low quality forage is unjustified, according to experiment station agronomist Craig Sheaffer. The bum rap on quality, and lack of palatability for animals, comes from the high alkaloid content of older varieties.

Low alkaloid varieties provide the same or better yield and quality than other cool season forage grasses harvested at a similar stage of maturity.

Reed canarygrass is also better adapted to diverse uses and a wide range of environmental conditions than most commonly used perennial forage grasses.

It can be planted in dense, pure stands, or in mixture with other legumes, and harvested as pasture, silage or hay.

A new bulletin from the Minnesota Agricultural Experiment Station describes the modern, palatable varieties of reed canarygrass in detail.

Reed Canarygrass covers pasture establishment and the plant's growth habits and fertility needs. It recommends establishment, grazing and harvest practices. It compares yield and quality for different varieties, and between reed canarygrass and other forage grasses.

A copy of this 8-page bulletin is available for $1, prepaid, through county extension offices, or from the MES Distribution Center, 3 Coffey Hall. University of Minnesota, St. Paul, MN 55108-1030. Request publication AD-SB-5533. Minnesota residents please also include 6% sales tax.

bicides because the back-ups are limited and more risky,'' he says. ''The only other options they have are rotary hoeing and cultivation, which are both weather dependent. If you can't get those operations done at the right time, you won't have effective weed control.

''If Poast treatments were an option, farmers could take the risk involved in using mechanical weed control,'' says Wyse. ''That would be great because they'd be more willing to risk growing corn without preplant or preemergence herbicides, which might work about half the time. But for those years when they couldn't get into the field at the right time or when mechanical means failed, they'd have Poast as a back-up.''

Wyse and Somers, a plant geneticist, were members of the team of Minnesota Agricultural Experiment Station scientists who isolated

take at least five years.

Somers says other developments may come from their research. When a normal corn plant is sprayed with Poast, the herbicide inhibits an enzyme, stopping fatty acid production. The plant dies because its cells cannot repair or build cell membranes, which are made of fatty acids.

In sethoxydim-tolerant corn, a gene has been altered so that the herbicide can no longer bind to the enzyme and inhibit it. Consequently, the plant is able to produce fatty acids as it normally would.

''We think this altered enzyme will allow us to ask some very basic questions about the control of fatty acid biosynthesis in plants,'' Somers says. ''It sits at the top of the biosynthesis pathway and may regulate the amount of carbon that's incorporated into fatty

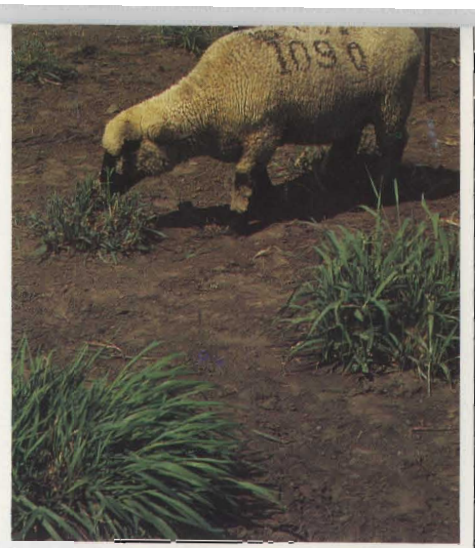
Corn *continues on back page*

they can by using the herbicide glyphosate and extensive tillage, leaving the land exposed to erosion.

''Although they try to eradicate it, they never get all the quackgrass. And even 99 percent control is not good enough. You can remove most of the quackgrass seed from bluegrass seed, but you can't remove it from tall fescue or perennial ryegrass seed. If we had Poast-tolerant grass varieties, we could use Poast to control quackgrass in seed production fields just as we'll use it to control quackgrass and other grassy weeds in corn. That could make tall fescue and perennial ryegrass more important crops in Minnesota.

''We have some Poast-tolerant perennial ryegrass seedlings that we hope to test in the field next year. Grass seed producers are just clamoring for the release of Poast-tolerant varieties.''

—Sam Brungardt



Low alkaloid reed canarygrass is well grazed: clearly more palatable than older varieties around it.

New Crisp Apple ''Explodes'' on Scene

What's in a name? Possibly a good indication of what's being named, if it's the new Honeycrisp apple.

''It's explosively crisp,'' says David Bedford, describing this most recent apple release by the Minnesota Agricultural Experiment Station.

Bedford, a research scientist with the experiment station's fruit improvement project, thinks Honeycrisp's future will be bright. He notes that consumers are demanding more variety and improved taste from apples.

Honeycrisp fills a waiting niche for Minnesota growers. They need a good storing, high-quality apple that ripens earlier than previous experiment station releases such as Fireside, Haralson, Keepsake, and Regent.

Honeycrisp is sweet, mild and slightly aromatic. It's exceptionally crisp and juicy. Its skin is solid to mottled red over a yellow background.

The new Honeycrisp apple deserves space on supermarket produce shelves, says experiment station fruit developer David Bedford.

The new apple's optimum harvest date for the Twin Cities is the fourth week of September. The fruit ripens evenly and holds on the tree well, making it harvestable all at once as commercial growers like to do, or bit by bit as backyard growers often prefer. In winter storage tests, Honeycrisp was rated equal or superior to Delicious, Haralson, Honeygold, Keepsake, McIntosh, and Regent in flavor and texture.

At Excelsior, Minn., trees of Honeycrisp have borne fruit annually without thinning. The trees have shown little winter injury, and bear baseball sized fruit from year to year, despite heavy cropping.

Honeycrisp is patented. Limited numbers of trees will be available to commercial growers and to the gardening public for planting this spring.

—Sam Brungardt

The *Varietal Trials* annual publication has been completely redesigned and slimmed down. Crops no longer being annually tested have been moved into separate fact sheet publications.

The new *Varietal Trials of Selected Farm Crops* now covers alfalfa, birdsfoot trefoil, reed canarygrass, tall fescue, timothy, amaranth, barley, oats, wheats (durum, hard red spring and winter), wild rice, canola and oilseed rape, soybeans, fieldpea and lupin.

The new *Varietal Trials* publication doesn't ignore the other crops which were traditionally included in the previous year's versions of the publication. The new format initiated in this 1991 edition includes explanations for where to obtain planting and crop management information for those crops.

The publication is available for $2, prepaid, through county extension offices, or from the MES Distribution Center, 3 Coffey Hall, University of Minnesota, St. Paul, MN 55108-1030. Request publication AD-MR-5615. Minnesota residents please also include 6% sales tax.

—Larry Etkin

Corn *continues from p. 4*

acids, which the plant joins together to make lipids and oil.

"These mutants provide us with the first opportunity to evaluate whether there's a change in the amount or kinds of fatty acids produced. If more fatty acids and more oil are produced, that would increase the energy content and the value of corn as a feed grain. That might create new utilization niches for corn oil, which could increase use of this already plentiful commodity.

"And if there is a change in composition—say, a greater proportion of unsaturated fatty acids are produced—that would make corn oil even more desirable as a cooking oil from a dietary standpoint. However," Somers cautions, "we're a far way off from being able to say that that's the case."

Somers says understanding the mutant gene's effect on production of fatty acids, lipids and oils may some day enable biotechnologists to genetically engineer more valuable, more useful or more healthful forms of familiar crops.

—Sam Brungardt

MINNESOTA Science

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Aspen *continues from p. 3*

there now that should cause any concern. But we felt to anticipate that concern, we needed to expand the number of parents involved."

Two new tetraploids artificially induced in native North American trees are now reaching maturity. That development is exciting for Wyckoff. "It gives us the opportunity to put our native tremuloides back onto tremula females."

Silvicultural "soil/site" factors are also being looked at.

"A given area of land and the soil beneath it and the moisture that reaches it create limitations. Now that plot of land, with that moisture and that nutrient situation, can only grow so

much wood. Whether you put that wood on a few trees or on a lot of trees, you are only able to produce so much wood per acre.

"You can improve on that by putting in more efficient trees; trees that are more efficient in using a lower quantity of moisture and nutrients. And you can find the optimum number of stems per acre," explains Wyckoff.

"We've found, for the most part, that somewhere about 500 to 600 stems to the acre, at least from a plantation standpoint, is where we want to be."

The project has also looked at short rotation, intensive culture: harvesting relatively young trees.

With under 600 stems per acre, "We're saying that to get larger diameter trees, we accept wasting that sunlight at early ages, knowing we're not going to have to come in and thin that stand at a later stage," says Wyckoff.

"Trees like hybrid poplar are being grown on shorter rotations. Forest managers want to have the maximum amount of leaf area on that site early on, so they're converting as much of that site potential to wood in a very short period of time. They are content to harvest smaller diameter trees, with a higher proportion of branches and bark."

Short rotation is important to paper companies such as the James River Corporation, where geneticist Brian Stanton says, "We consider the work that the project is doing very pertinent and important to our efforts to develop new species as short rotation crops."

The university attracted the aspen/larch project to Grand Rapids when the Institute for Paper Chemistry moved from Wisconsin to Georgia. Its breeding research, begun in 1954, is one of the older hardwood programs in existence.

"One of the biggest strengths is its history of good cooperative efforts between the industry, universities, research facilities, various government agencies," says David Karnosky, director of the Center for Intensive Forestry at Michigan Tech.

"Breeding is on-going," Wyckoff points out. "You never really reach an end. You're upgrading, you're bringing in new genotypes, you're always trying to keep that variability present."

"I would agree with that, absolutely!" says Karnosky.

—Larry Etkin

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