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Agricultural Research Division 112th Annual Report 1998

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On the cover: This collage illustrates the Agricultural Research Division’s broad range of research. The work of ARD scientists expands the world’s knowledge base and enhances Nebraska’s agriculture, environment, natural resources, rural communities and the quality of life of all Nebraskans. On the back cover: “Tower to the heavens” is how one pioneer described Chimney Rock, the most recognized landmark on the Oregon Trail. This famous rock pinnacle in western Nebraska, shown here at sunset, guided travelers and settlers headed West. Photography by Brett Hampton; IANR aerial photo.
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To simplify technical terminology, trade names of products or equipment sometimes are used. No endorsement of products is intended nor is criticism implied of products not mentioned.

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Our Mission

The mission of the Agricultural Research Division in the Institute of Agriculture and Natural Resources at the University of Nebraska-Lincoln is to conduct problem-solving and fundamental research that addresses priority issues facing Nebraska’s agricultural and food industries; provides the knowledge base essential for managing our natural resources; promotes family well-being and community development; and educates future scientists through hands-on experiences.
It is a pleasure to provide you with a copy of the 112th Annual Report of the University of Nebraska Agricultural Research Division (ARD). This report is our chance to provide you with information about our programs and accomplishments and for us to evaluate the effectiveness of our collective research efforts. After examining this report, we hope that you will agree with our assessment that ARD research has provided new knowledge and technology to Nebraskans to improve the profitability of their enterprises, to enhance environmental quality and to improve their quality of life.

This report provides some highlights of research accomplishments, a listing of scientists and research associates, outputs from our research projects, awards received by faculty and graduate students, and the ARD financial report for the period July 1, 1997 to June 30, 1998. This report was compiled in compliance with the intent of the law of the State of Nebraska that established the Nebraska Agricultural Experiment Station on March 31, 1887.

The ARD is the primary research component of the Institute of Agriculture and Natural Resources (IANR). Currently celebrating its 25th anniversary, IANR was created by an act of the Nebraska Legislature in 1973. During the 25-year period since IANR’s establishment, ARD scientists have made many notable accomplishments including: improved irrigation management through scheduling, development of more accurate nitrogen fertilizer recommendations to minimize groundwater contamination, release of a prolific swine genetic line, development of conservation tillage technology and equipment, release of many improved cultivars of agronomic and horticultural crops, development of restructured meat products, commercialization of a calf scour vaccine, and development of several industrial uses for agricultural products. Several examples of more recent accomplishments are given in the Research Highlights section of the report.

We continue to be excited about our research programs and the scientists who work to solve today’s problems and help provide the knowledge necessary to address the problems of tomorrow. We welcome your input on our current programs and on your needs for research information.

Darrell W. Nelson
Dean and Director
Agricultural Research Division
The Agricultural Research Division is the only public entity in Nebraska charged with conducting agricultural research. It is part of a national network of state agricultural experiment stations located in Land Grant Universities across the United States. In 1973, the state legislature passed LB 149 which established the Institute of Agriculture and Natural Resources. The Agricultural Research Division was created as one of IANR’s six divisions. The state legislation also expanded the federal mandate for agricultural research conducted by the Nebraska experiment station to include research in natural resources, human resources and family sciences. The ARD research portfolio represents a scientific investment in Nebraska’s future. ARD research not only solves today’s problems, it also defines tomorrow’s opportunities.

Combating E. coli on the farm, ranch and feedlot level

From feedlots to bacterial DNA, IANR scientists are concentrating on preharvest research in an intensive effort to reduce the risk of E. coli 0157:H7, the deadly bacteria responsible for numerous ground beef recalls.

In the year following Hudson Foods massive ground beef recall in August 1997, IANR has collaborated with state government and the beef industry to address the E. coli threat. In April 1998, the legislature passed a bill that provides NU $250,000 annually for five years for basic E. coli research. IANR has garnered several other grants to support this effort.

IANR is concentrating on E. coli at the farm, ranch and feedlot level. This preharvest focus aims to significantly reduce the chances of E. coli 0157:H7 reaching the processing plant. A new multi-disciplinary, statewide research team initiated numerous new projects to study E. coli.

For example, a veterinary scientist heads a project to identify management strategies to help feedlot managers reduce E. coli’s presence in feedlots. Researchers are developing efficient tests to detect 0157:H7 in groups of cattle because testing each animal isn’t practical. Tests will help identify groups of cattle carrying the bacteria, determine the environmental factors that encourage 0157:H7 in feedlots, and develop management strategies that discourage the bacteria.

Understanding E. coli’s genetics, physiology and biochemistry, and how it survives in cattle are other targets of preharvest research for scientists in food science and technology, animal science, veterinary science, the Beadle Center and the School of Biological Sciences.

IANR peanut allergen test commercially available in 1998

People with peanut allergies can be more confident that foods on the store shelf are safe for them to eat.

IANR food scientists developed a fast, accurate test to detect traces of peanut allergens in processed foods. The test became commercially available in 1998. A Michigan company is marketing the test to the food industry under a university licensing agreement.

The peanut test is one of several highly powerful, highly sensitive tests for food allergens that IANR’s food allergy research team is developing.

New tests for egg and casein (a milk component) allergens should be commercialized in 1999. Tests for soybeans and tree nuts are in the works.

The tests detect cross-contamination, allergenic food residue that contaminates another food processed on the same equipment. Processing different foods on the same equipment is common and economically necessary. Processors clean equipment to prevent cross-contamination, but they’ve lacked a thorough way to detect minute amounts of residue.

NU’s program is one of the few nationwide focusing on food allergies from a food industry perspective. Industry teamed with the university for help with this major concern.
Researchers assessing a community’s ability to find funding for improvements

IANR research could help assure that the neediest communities receive shrinking government dollars for sewer, water and other public projects or services. Traditionally, governments primarily use median household income for awarding communities such grants, meaning towns with low household income are more likely to get financial assistance. In the real world, a town’s ability to fund improvements is more complex. An IANR agricultural economist developed a formula, called a financial capacity index, that factors in both community economic snapshot and a more complex cultural economist developed a formula, called a financial capacity index, that factors in both community economic snapshot and a more complex level playing field for rich but income-poor towns.

By calculating a community’s per capita income, household income distribution and property valuation per household, this financial capacity index helps adjust for differences in property-rich but income-poor towns. The index is based on studying Nebraska’s 439 incorporated towns under 5,000 population and ranking their ability to pay for sewer and water services. Taking wealth and income into account may show that towns traditionally considered poor may be better able to pay for public services than current formulas assume.

Small towns face higher costs and/or reduced services unless state or local governments adopt more efficient funding methods or boost existing funding for public projects or services. This formula might help make tough funding decisions. The research could apply to other policy issues, such as state education aid or welfare and tax reform.

Scientists creating wheat with broad viral resistance

An IANR molecular biologist’s idea to borrow genes from mammals to protect wheat plants against deadly virus diseases is proving effective. Using an array of biotechnology techniques, researchers inserted two genes from a mammalian anti-viral system into wheat plants. The transgenic plants grow, reproduce and, most importantly, show resistance to destructive wheat streak mosaic virus.

The system still must be tested against other significant wheat viruses. However, researchers are optimistic, because it worked against seven different viruses in tobacco plants.

Controlling multiple viruses is much more difficult than the usual practice of instilling disease-specific resistance, but it translates into money in farmers’ pockets. In the field multiple viruses attack wheat, so broad resistance is important. Nationwide, losses from wheat streak mosaic and three other wheat viruses cost growers $230 million to $450 million annually.

In a typical year 10 percent of the wheat is infected in west central Nebraska and the Panhandle, where wheat streak mosaic is most common.

Researchers are testing second-generation transgenic wheat plants for disease resistance. Those tested so far show varying resistance to wheat streak mosaic virus.

Research is yielding better ways to scout weeds in the field

To make informed weed management decisions, farmers need to know where and how many weeds are in fields. That’s tricky because weeds tend to be scattered and patchy.

Improved IANR scouting recommendations that account for weed distribution and growth characteristics should help more accurately assess weed infestations. These recommendations are based on NU weed science research that is yielding comprehensive scientific information about how, where and why different weeds grow in typical farm fields.

The new scouting recommendations involve dividing fields into four blocks and checking weeds in five sites per block. This approach more accurately reflects weed variability than scouting field edges or only a few spots.

Scouting 20 sites shows spatial differences such as problem patches and weed-free areas. Farmers then can decide whether to treat the field uniformly based on average weed conditions or to tailor site-specific controls.

Some producers and crop consultants scout fields more intensively. More information is better, but IANR weed scientists wanted to devise a method practical for most growers.

These improved scouting techniques have been incorporated into WeedSOFT, NU’s weed management software program, which is used to manage weeds on more than a half million Nebraska crop acres.

Scouting recommendations and other findings from this
Weed Scientist Dave Mortensen counts weeds within a sampling area of a soybean field. Intensive weed sampling and mapping is part of the research that is providing comprehensive scientific information about weed distribution, densities and growth patterns in typical fields. One research outcome already is being used in Nebraska fields.

Research encourage a more information-intensive approach to managing fields so farmers can match controls to the biology of the weed population.

Weed scientists say farmers with accurate weed information often have more control options, which can mean less herbicide and lower per-acre costs.

**Trying to make warmed-over flavor a thing of the past**

Remember that warmed-over flavor that is the essence of the chicken cordon bleu frozen dinner? IANR researchers are developing products and processes to help make warmed-over flavor a taste of the past.

IANR nutrition scientists hypothesized that protecting frozen food from oxygen would prevent the oxidation of fat compounds that causes warmed-over flavor. This seemed an ideal use for the edible films being developed and tested by IANR researchers in Biological Systems Engineering and Food Science and Technology.

Edible films use starches and proteins from Nebraska's top crops — corn, wheat, soybeans and sorghum — and other agricultural products to make plastic-like sheets. These environmentally friendly films may replace polyethylene and other non-degradable films for selected uses.

Widespread use of edible films depends on successful research showing their functionality: that's where warmed-over flavor comes in.

Researchers combat warmed-over flavor three ways: wrapping cooked pork chops or hamburgers in edible films, mixing antioxidants into ground beef, and permeating films with antioxidants. An IANR food scientist is studying naturally occurring antioxidants produced in plant tissue cultures that could be used on the edible films.

Interest growing in cards from corn

That prepaid phone card in your wallet looks and feels like plastic, but it may come from corn.

NU Industrial Agricultural Products Center researchers developed a degradable additive and a process for blending it with commercially available polyactic acid (PLA) resin, made from cornstarch. Combining the additive, called Soft-Touch II, with PLA produces a plastic perfect for making credit cards and prepaid phone cards.

The university has filed U.S. and international patents on Soft-Touch II and the production process.

These new cards look, feel and perform like conventional petroleum-based plastic cards with one environmentally friendly twist. Pitch them in the compost instead of the garbage when they expire and they'll disappear in six to eight weeks. Conventional cards made from polyvinyl chloride (PVC) take thousands of years to degrade in landfills.

PLA, a versatile bioplastic resin, tends to be very hard or soft. Phone and credit card production requires a somewhat flexible material that cuts and prints easily. The center's invention enhances PLA for this use.

The center developed the process when a central Nebraska entrepreneur sought help making compostable prepaid phone cards. This company, CornCard International, now markets compostable phone cards under the trade name Mazin.

With 6 billion plastic cards produced annually worldwide and a predicted volume of 9 billion by 2001, the market for compostable cards looks promising. Europe is banning PVC plastics so environmentally friendly alternatives must be used by 2000.
Sorting out the roles of different fats in heart disease

By studying fats’ role in heart disease, an IANR researcher has found a significant piece of the puzzle behind Nebraska’s and the nation’s leading cause of death.

For years, high cholesterol levels have been considered a major heart disease risk. A nutritional scientist in the NU College of Human Resources and Family Sciences entered a new area of heart disease research by studying how fats affect the liver.

He discovered that saturated fats aren’t equal. Saturated fats in beef and cocoa butter discourage cholesterol absorption. The cholesterol-raising palmitic acid in saturated fats such as palm, coconut and other tropical oils promotes the disease.

His earlier research showed that monounsaturated fats, such as those in olive oil, speed cholesterol’s move from the liver into the bloodstream, increasing cholesterol levels and heart disease risk.

Although fats aren’t equal, they all are calorie dense. Research suggests that most Americans should follow the time-tested adage of eating a balanced diet with fewer calories. This animal-model research eventually could help explain how heart disease progresses in humans. That’s significant because people often don’t know they have the disease until they have a heart attack.

Researchers studying adults who survived traumatic childhoods

Many adults repeat the abusive behaviors they endured as children with their own children. Many don’t.

IANR family scientists studied those who don’t repeat the abuse cycle in an effort to understand how they survived and transcended traumatic childhoods.

College of Human Resources and Family Sciences researchers didn’t intend to focus only on emotional, physical or sexual abuse survivors, but they found that abuse was an integral part of almost every traumatic childhood. In 89 of the 90 cases studied, at least one aspect of trauma was abuse.

Respondents were asked to categorize traumatic life events by checking applicable items on a list of 22 events ranging from abandonment and discrimination to war, poverty and sexual abuse. Some checked as many as 19 events.

Eighty-three percent of respondents said they survived and transcended their childhood trauma, 11 percent said they only survived, and 6 percent didn’t answer.

Survivors described many different coping mechanisms. Seventy percent said developing a spiritual life was helpful, although their views on organized religion varied. Connecting with good people, becoming a high achiever in a career or in school and forgiving one’s parents were common paths for coping, researchers found.

About 61 percent had some experience with professional counselors, but many preferred attending support groups with others who survived similar traumas.

Sandhills spring meadow grazing jump-starts cattle

Spring grazing on the Nebraska Sandhills’ lush wet meadows benefits cattle and offers ranchers management flexibility, a three-year study by IANR agronomists found.

In early May, wet meadows have a luxuriant new green growth of Kentucky bluegrass, timothy, bromegrass, wheatgrass and other cool-season species — a great spring, high quality replacement for hay.

Extending the grazing season cuts ranchers costs by minimizing hay costs, which account for 18 to 24 percent of the total expenditure of producing a weaned calf.

In the spring meadow grazing treatment, cattle grazed meadows from May 10 to June 10, then grazed range from June 11 to Oct. 6. Cattle in a traditional treatment were fed hay from May 10 to June 10 and then grazed range.

Researchers found meadows produced about the same amount of forage, regardless of grazing or harvest strategy. The real differences appeared in crude protein yield and content.

Meadows grazed in May had a good protein content of 13 percent when cut for hay on July 25. Hay from ungrazed meadows had a crude protein content of 9 percent.

Cattle fared better on spring meadow grazing. Calves grazing meadows gained 20 more pounds in May than those on hay. Cows that started on meadow grazing scored better for body condition and kept that good condition through the summer.
Using herbicide makes wildflowers easier to establish

Homeowners may want to plant wildflowers in their landscapes, but too often what was meant to be a prairie-like mix of grasses and wildflowers ends up as a weed patch.

Weed competition is the biggest problem in wildflower establishment. IANR horticulturists, a USDA Agricultural Research Service range scientist at NU and agronomy graduate students tested a herbicide treatment that beats out weeds, making native wildflower and grass establishment simpler and more reliable.

Because prairies mix grasses and broadleaf wildflowers, herbicides have not been useful for controlling weeds in prairie plantings. Most herbicides selectively target either grasses or broadleaved plants such as wildflowers, or non-selectively kill both types of plants.

The IANR researchers found that 'Plateau' herbicide, recommended for control of broad-leaves and grasses, didn't affect composites or legumes, plant families that include many prairie wildflowers.

They screened six native wildflowers and grasses for their tolerance to the herbicide and developed an application rate that could be recommended specifically for wildflower establishment. The herbicide reduced weed competition and the time required for wildflower establishment, researchers found.

The best use for the herbicide is for large areas, such as aeroages, roadsides and golf course roughs, where some damage can be tolerated.

The herbicide’s manufacturer is expected to market a two-acre size package of Plateau for homeowners and landscape professionals in 1999.

Tracking Pine Ridge elk aids wildlife management

A helicopter-powered elk roundup in western Nebraska’s Pine Ridge was the first step in a three-year IANR study of Nebraska’s elk population.

A commercial capture team hobbled 16 elk in 1994, tagged their ears and fitted them with heavy-duty, battery-operated radio collars. The radio collars emit a radio frequency once every second, allowing scientists to track elk movements.

Researchers made more than 10,000 readings using the radio collars during the study.

Wildlife biologists in UNL’s School of Natural Resource Sciences teamed with the Nebraska Game and Parks Commission, the U.S. Forest Service and the Rocky Mountain Elk Foundation as part of the Nebraska Elk Management Plan. The project studied the habits and structure of Nebraska’s elk population, the effect of human practices on the elk and the attitudes of landowners, hunters and tourists toward the big animals.

Researchers estimated the size of the elk population, determined the animals’ age, sex and health and tracked their seasonal distribution and habitat use. They spotted about 150 elk in Pine Ridge and estimated that the actual number is between 175 and 225.

Documenting how and where elk spend their time allows wildlife managers to make informed decisions about protecting the elk and their habitats.

Chicory a potential alternative crop for the Panhandle

A new food ingredient made from chicory root could translate into an alternative crop option for western Nebraska producers.

NU Panhandle Research and Extension Center researchers have studied the feasibility of growing chicory, a blue-flowered plant that resembles sugar beets, under western Nebraska conditions. Chicory, like sugar beets, is a root crop, but it is genetically unrelated, making chicory resistant to most sugar beet pests. IANR research showed that Nebraska’s sugar beet producers could grow chicory with minor adjustments in machinery and farming techniques.

Chicory production looks promising because its root contains inulin, a new food ingredient that enhances low-fat or fat-free foods. The food industry is interested in inulin’s potential as a substitute for high-calorie, fat-based food ingredients.

Low- and fat-free foods lack fat’s ”texturing” properties and have less texture, mouth-feel and flavor. Inulin, a fructose-based polymer, forms a creamy, fat-like gel when dissolved in water and provides body and texture for prepared foods.

The pharmaceutical industry also may be interested in inulin. It helps stimulate beneficial bifido bacteria in the lower intestine. Its low-sugar qualities also make it useful for diabetic diets.

A private company, Cascadian Inulin, operated a small pilot inulin extraction plant at the center before moving to private quarters in fall 1998. The center produced 5 acres of chicory for the pilot plant. Processing techniques have been perfected to extract high quality inulin from Nebraska chicory.

Chicory probably can be grown almost anywhere that sugar beets are produced. This IANR research aims to give Nebraska a head start on other U.S. beet-producing areas. If successful, western Nebraska will be the first to produce domestic inulin.
Vet scientists target devastating viral swine disease

An IANR veterinary science team has led the way in characterizing a devastating viral swine disease and conducting research trials of a vaccine.

Porcine Reproductive and Respiratory Syndrome (PRRS) costs swine producers in the United States, Canada and Europe millions of dollars annually. PRRS symptoms include infertility, abortions, severe pneumonia in baby pigs, encephalitis and heart problems. Sometimes entire litters are born dead.

IANR researchers have discovered that the virus causes infertility in boars by killing cells in the testicles. They also were the first researchers to find the virus in sows’ ovaries.

Other research focusing on how the virus is transmitted has discounted initial theories about airborne transmission. Pig-to-pig contact, from an infected animal being introduced to a herd, is the No. 1 way the virus is transmitted, researchers found. Scientists continue to study how long the virus can be maintained in the pig’s body and still cause disease, information needed for breaking the infection cycle.

Researchers say the best protection against PRRS is good management and sanitation practices.

PRRS vaccines are available. The IANR team conducted research trials for a vaccine now marketed by Schering Plough Animal Health Inc.

Three-year fallow rotation system cuts wheat weed woes

Switching to a three-year fallow rotation system can help western Nebraska wheat growers solve one of their biggest weed problems, a seven-year study at NU’s Panhandle Research and Extension Center shows.

Downy brome, jointed goatgrass and winter ryegrass have the same life cycle as winter wheat, so these plants cannot be destroyed when they grow with wheat. The grasses go to seed, leaving a crop of weed seeds in the fallow field the following summer.

This study included two-year wheat fallow rotations with two different tillage treatments to control weeds: herbicide application in the fall with shallow tillage in the summer, and shallow tillage in fall and summer.

The three-year rotation used two different crops. Rotations included: wheat/sunflower/fallow, wheat/proso millet/fallow and wheat/fallow/fallow.

After six years, wheat in the three-year rotation had 1/100 the number of weeds in the two-year rotation. The different three-year systems were equally effective.

Researchers believe that switching to a three-year rotation would end the weed problem. They’re studying what crops could be added for a profitable three-year rotation.

Brighteners boost sun-blocking power of clothing

Choosing laundry detergent with optical brighteners can boost the clothing’s sun-blocking ability, NU textiles science research shows.

Outdoor gear enhanced with sun protection claims to help block the sun’s ultraviolet rays. UV rays can lead to reddening skin, wrinkles, premature aging and skin cancer.

A textiles scientist’s preliminary research showed that adding a UV absorber finish to fabrics enhances their sun protection properties, blocking UV radiation from reaching skin under the fabric. The scientist also discovered something surprising: washing cotton fabrics repeatedly in a detergent with brightening agents actually enhanced the fabrics’ sun protection levels.
Most liquid or powdered commercial detergents contain these brighteners. They absorb UV rays and bounce them back as a bluish light, giving white textiles the bright blue-white most consumers consider clean.

Researchers calculated a fabric’s sun-blocking abilities and assigned UPF (ultraviolet protection factor) ratings, similar to sunscreen’s SPF (sun protection factor) ratings. For example, a knit cotton T-shirt’s UPF rating jumped about six times, from 6.5 to 38.4, after 20 washes.

The IANR researcher hopes to develop an accurate, simple test manufacturers could use to evaluate UV protective clothing. The test could lead to a label rating to aid consumers.

**Modifying microbes might decrease ammonia waste**

Excess nitrogen in animal waste is becoming an important environmental concern for beef producers. IANR animal scientists are working to solve the problem by modifying bacteria in the digestive systems of cattle. Cattle don’t digest food on their own. They need help from bacteria in the rumen, the large first compartment of their complicated digestive systems.

When cattle eat protein-rich diets, these bacteria break down protein into ammonia, a nitrogen compound. They reuse ammonia to make new proteins, which aid bacterial and cattle growth. But ruminal bacteria are too efficient; they often produce more ammonia than they use. Excess ammonia becomes waste, excreted in cattle’s urine. It can make up as much as 25 percent of the animal waste nitrogen in the environment.

The researchers aim to slow down the ammonia production of these organisms in the rumen. That might allow producers to feed less nitrogen while still meeting animals’ needs.

They are using biotechnology techniques to develop mutant forms of a key ruminal bacterium lacking an enzyme that has been shown to be one of the major protein digesting enzymes in the rumen.

When grown in laboratory cultures with another ammonia-producing bacterium, the mutant bacteria reduced ammonia production 25 percent, showing its important role in controlling ammonia production. The mutant bacteria should aid studies of the enzyme’s structure and function, and strategies to inactivate it.

**Prolific swine line rare public release**

A highly prolific line of pigs developed during 16 years of landmark IANR swine reproductive research became available to commercial breeders in 1997 through a rare public release.

Companies that purchased pigs from the Nebraska Index Line are evaluating their potential for use in commercial breeding programs. Semen from the line’s boars was used to father 600 females participating in the National Pork Producers Council Maternal Genetic Evaluation Program.

It is believed to be the only university-developed swine line released to commercial industry in the last 30 years.

The line is the result of 15 generations of persistent genetic selection to increase litter size. Developed for research on genetic characteristics affecting litter size, the line is one of the few of its kind in the world. Sows from this line produce an average of 2.1 more live pigs per litter than a control line typical of today’s herds.

Although the line was developed for research, IANR animal scientists who worked on this project recognized its commercial potential.

NU invited a group of industry representatives to help establish release procedures and to make the line’s unique genetics available to commercial breeders before releasing pigs.

**Designing systems that can tell weeds from crops**

Computers are mighty powerful, but getting them to see things as humans do is a big challenge.

IANR biological systems engineers and weed scientists are attempting to imitate human perception as they program computers to distinguish weeds from crops. They want to design an advanced machine vision system that analyzes a visual signal from a camera to determine if the object pictured is weed, crop or soil.

Such a system someday might become the computerized eyes and brain of a herbicide sprayer rig that would turn on momentarily only if it spotted a weed. Researchers elsewhere are working on optical sensors to distinguish between soil background and plants to target weeds growing between crop rows. IANR researchers are taking this idea another step, developing systems that detect and identify different plant species, especially weeds.

Their aim is a system that categorizes plants by species, using identifying characteristics such as shape, canopy, leaves, color and texture. They’ve developed software to aid this effort.

So far, the system works best on young plants with new, fully exposed leaves near their canopy. Mature plants are tougher to distinguish because leaves in their complex canopies overlap and create shadows.

It’s a perplexing computer science problem, but success could yield economic and environmental benefits. A system that knows weeds from crops could make it easier to spot spray weeds after they come up instead of treating entire fields before weeds emerge. Such spot treatment could reduce herbicide use.
A Few More Glimpses at ARD Research ...

Regular exercise is a good habit, but too much may indicate a problem. An IANR nutrition scientist devised the Exercise Habits Inventory, a questionnaire to help identify possible cases of exercise dependence syndrome and to determine how exercise and eating disorders are related. Tests done since 1993 support the inventory’s validity. When researchers conducted eating attitudes tests along with the inventory, they found strong links between eating habits and exercise dependence.

Golf course superintendents and homeowners weary of mowing and watering may want to consider three new turf-type buffalograsses released by NU. The newcomers, called 91-118, 86-61 and 86-120, are the latest result of ongoing IANR research to develop environmentally friendly, low-maintenance turfgrasses. They need half the water and fertilizer and far less maintenance than most conventional turfgrasses. Variety 91-118’s cold hardiness, good sod production and turf quality should interest golf course operators. The other two varieties are well-suited to home lawns.

Range recovers quickly from fire, but there are dramatic changes. While some types of vegetation increased, an IANR range scientist at NU’s West Central Research and Extension Center found fire is tough on little bluestem, an important forage grass. A year after fires on three Sandhills ranches, researchers found little bluestem declined 75 percent from pre-fire levels. By the second year after the fires, little bluestem was coming back. This research should yield recommendations on the best grazing deferment strategies to help range recover from fire.

Many rural business leaders view information technology as crucial to community survival. They say education on using this technology is a high priority, an IANR survey found. NU’s Center for Rural Community Revitalization and Development teamed with Nebraska’s Division of Communications to survey business people on computer experience and expectations. Believed to be the nation’s first look at a state’s computing education needs, the survey will help policy-makers target training needs.

A 5-year IANR study of how calf weaning dates affect profit potential and cow performance tracked trade-offs associated with calves weaned at 5, 7 and 9 months. Weaning typically is at 7 months. Animal scientists found early weaning cows weighed more and were in better body condition at calving than normal and late weaning cows. However, early weaned calves weighed less at weaning than normal or late weaned counterparts. Early weaning shifts nutritional needs from cow to calf. Producers must decide how much calf weight they can sacrifice to reduce cows’ feed inputs and still remain profitable.

Deciding what to plant can be the difference between profit and loss. An IANR cropping systems researcher is working on a computer program that someday could help producers make complex production decisions. One system he’s developing uses a weather simulator to calculate the probability of different weather patterns, including periods of drought and adequate moisture. The aim is to help farmers anticipate a range of possible weather for the next growing season so they can make the best possible decisions. Eventually, researchers foresee developing decision-support systems that tap into online soil, weather, economic and other data to provide site-specific risk assessment tools.

Carefully formulating the amount of protein in cattle and swine diets can reduce the nitrogen waste released into the environment and sometimes can reduce feed costs, several IANR animal science studies show. Studying how efficiently beef and dairy cattle, and swine use dietary protein, researchers found that rations often supply too much protein. Animals can perform well on less protein and produce less nitrogen waste.

Nearly 80 percent of Nebraska’s roughly 2 million wheat acres are planted to varieties developed by NU’s joint IANR-USDA breeding program. It’s estimated that planting these improved NU wheat varieties boosts growers’ incomes by more than $40 million annually.

Sometimes it pays to be flexible. An IANR agricultural economist and a visiting agronomist are developing a worksheet to help farmers decide whether they’d benefit from adjusting planting plans to predicted weather and financial conditions. They want to make it easier to assess potential payoffs from different crops for a given year based on preseason moisture, soil nitrogen levels, projected yields and futures market prices. They don’t recommend farmers abandon longer-range planning but, they say, planting flexibility might pay off in certain years. The worksheet could be available within a year.

Pork producers can reduce water waste and manure volume by matching watering devices to their waste storage system’s overall goals, research at NU’s Northeast Research and Extension Center shows. An IANR swine scientist studied different types of commercially available waterers, documenting waste volume and pig performance. Based on this research, he recommends that specification of watering devices become more critical in planning swine facilities.
Faculty Awards and Recognitions

The impact and quality of ARD research can be assessed in many ways. One measure of excellence is the recognition researchers’ work receives from peers and those who benefit from the research. A number of ARD faculty members are widely recognized as leaders in their disciplines, and a number received international, national, regional and/or state honors.

Many ARD faculty also serve as officers or directors in their professional societies and state, regional, national and international organizations. Some are editors and associate editors of professional journals. We applaud their efforts in furthering the knowledge and professionalism of their disciplines.

Agronomy

P. Stephen Baenziger received the Agronomic Crops Award from the American Society of Agronomy.

Kenneth G. Cassman received the Fellow Award from the Soil Science Society of America.

Charles A. Francis received the Agriculture Stewardship Award from the Nebraska Sustainable Agriculture Society.

Jerry W. Maranville received the Fellow Award from the American Society of Agronomy.

Jeff Pedersen received the Fellow Award from the Crop Science Society of America.

James F. Power received the Hugh Hammond Bennett Award from the Soil and Water Conservation Society.

Animal Science

Mary M. Beck received the Outstanding Contribution to Status of Women Award from the Chancellor’s Commission on the Status of Women.

Larry V. Cundiff received the Excellence in Research Award from the University of Nebraska-Lincoln Chapter of Gamma Sigma Delta and the Pioneer Award from the Beef Improvement Federation.

Robert M. Koch received the Award of Merit from the University of Nebraska-Lincoln Chapter, Gamma Sigma Delta.

Richard K. Koelsch received the Pork Industry Service Award from the Nebraska Pork Producers Association.

Thomas W. Sullivan was inducted into the Hall of Distinction at Arkansas Tech University.

Animal Science Department Dairy Research Herd received the All Nebraska Dairy Herd Improvement Association Premier Breeder & Producer Award from the Nebraska Holstein Association.

Biochemistry

Carolyn M. Price received a Senior Fellowship from the National Institutes of Health.

Biological Systems Engineering

Thomas G. Franti received two 1997 Superior Paper Awards from the American Society of Agricultural Engineers.

Milford A. Hanna received the Engineering College Faculty Research Award from the College of Engineering and Technology.

LaVerne Stetson received the Outstanding Contribution to Nebraska Agriculture Award from the Nebraska Section of the American Society of Agricultural Engineers.

Darrell G. Watts received the USDA Group Honor Award for Excellence as Management Systems Evaluation Area (MSEA) Principal Investigator from the United States Department of Agriculture.

Wayne E. Woldt received the Best Paper Presentation Award at the American Society of Agricultural Engineers Mini Conference on Emerging Technologies in Hydrology.

Entomology

Scott Hutchins received the Outstanding Young Alumnus Award from the Iowa State University Alumni Association.

Family and Consumer Sciences

John DeFrain received commendation for the Parent Aide Support Service Program (supporting child abuse and neglect treatment/prevention program) from the Department of Health and Human Services, State of Nebraska.

Carolyn Pope Edwards received the Invited Fellow Award for the Centre for Advanced Study from the Norwegian Academy of Science and Letters, Oslo, Norway.

Kathleen Prochaska-Cue received the Leader of the Year Award from the American Association of Family and Consumer Sciences.

School of Natural Resource Sciences

Kyle D. Hoagland received the Initiative Team Award from the Institute of Agriculture and Natural Resources.

Shripat T. Kumble received the Award of Merit from the North Central Branch of the Entomological Society of America.

Roy F. Spalding received the IANR Team Effort Award for the Management Systems Evaluation Area Water Quality Team from the Institute of Agriculture and Natural Resources; and the Certificate for Excellence in Leadership from Region VII, U.S. Environmental Protection Agency.

Veterinary and Biomedical Sciences

Fernando Osorio received a Fulbright Scholarship to teach and study in Brazil from the United States Information Agency.

Northeast Research and Extension Center

John Witkowski received the ASAE Blue Ribbon Award from the Nebraska Soybean Field Guide.

David P. Shelton received the ASAE Blue Ribbon Award from the Nebraska Soybean Field Guide.

Panhandle Research and Extension Center

David D. Baltensperger received the Fellow Award from the American Society of Agronomy.
Graduate Student Awards and Recognitions

One of the primary missions of the ARD research program is to develop the scientists of tomorrow. We are committed to providing exceptional graduate students with the opportunity to work with and learn from our research faculty.

ARD is among the national leaders in research in food production and processing, natural resources management and family sciences. Approximately 699 graduate students are pursuing advanced degrees with ARD faculty. The quality of our graduate students is reflected in the recognition they receive.

Animal Science

Christi M. Calhoun received a travel grant award from the Nebraska Chapter, Sigma Xi; a second place award in the Ph.D. poster competition from the American Meat Science Association and was a member of the UNL team that won the Product Development Competition with its product “Twist Steak” from the International Food Technologists Student Association.

Galen E. Erickson received the Vincent H. Arthaud Travel Award from the Department of Animal Science.

Karol E. Fike received the John Hallman Memorial Award from the Department of Animal Science.

Robert L. Fischer received the Mary and Charles C. Cooper/Emma J. Sharpless Fellowship from the College of Agricultural Sciences and Natural Resources and the Agricultural Research Division.

Tanmy R. Fojtik received the Vincent H. Arthaud Travel Award from the Department of Animal Science.

Sergio Gomez received the Vincent H. Arthaud Travel Award from the Department of Animal Science.

Mark J. Klemesrud received the third place award in the graduate student paper competition from the Midwest Section, American Society of Animal Science/American Dairy Science Association.

Bradley R. Lindsey received the graduate student paper competition award from the Nebraska Chapter of Sigma Xi.

Bernadette M. O’Rourke received the Vincent H. Arthaud Travel Award from the Department of Animal Science and was awarded second place in the M.S. poster competition at the American Meat Science Association meetings.

Timothy D. Schnell received the National Pork Fellowship from the National Pork Producers Council, a fellowship from the Institute of Food Technologists, and was member of the UNL team that won the product development competition with its product “Twist Steak” from the International Food Technologists Student Association.

Rebecca K. Splan received the Frank Baker Essay Contest Award from the Beef Improvement Federation and the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

Zhiqiang Chen received the American Heart Association Fellowship from the Nebraska Chapter of the American Heart Association.

Sumedha Gulati received the American Heart Association Fellowship from the Nebraska Chapter of the American Heart Association, the Outstanding Poster Award from the Federation of the American Society of Biochemists and Molecular Biologists, the Ed and Clara Degering Fellowship from the University of Nebraska Foundation, and the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

Saurabh Menon received the Widaman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

Xiu-Qing Zhang received the Milton E. Mohr Graduate Fellowship from the Center for Biotechnology.

Biological Systems Engineering

Ajoy P. Koppolu received the Milton E. Mohr Research Fellowship from the University of Nebraska College of Engineering and Technology.

Glenn L. Rosenhamer received the Milton E. Mohr Research Fellowship from the University of Nebraska College of Engineering and Technology.

Walter S. Gorneau received the Milton E. Mohr Research Fellowship from the University of Nebraska College of Engineering and Technology.

Karen R. Lochte-Watson received the Graduate Student of the Year award from the Mid-Central American Society of Agricultural Engineers Conference.

Entomology

Jon C. Bedick was given a master’s poster award at the North Central Branch Entomological Society of America meetings; received a research grant from the Center for Great Plains Studies and was on the second-place team in the Limnaea Games Team competition at the North Central Branch Entomological Society of America meetings.
Thomas Clark received a Bukey Memorial Fellowship from the Office of Graduate Studies; Graduate Student Award for Leadership in Applied Entomology from the Entomological Foundation, sponsored by Dow Elanco; a Donald Walters Miller Fellowship from the Office of Graduate Studies and was on the second-place team in the Linnaean Games Team competition at the North Central Branch Entomological Society of America meetings.

Christina Davis received a Mary and Charles C. Cooper/Emma I. Sharpless Fellowship from the College of Agricultural Sciences and Natural Resources and the Agricultural Research Division.

Fikru Haile received a Henry F. and Jean D. Holtzclaw Fellowship from the Office of Graduate Studies; a Mabel J. Reichenbach Fellowship from the Office of Graduate Studies; a Hardin Distinguished Graduate Fellowship from the Agricultural Research Division; and was on the second-place team in the Linnaean Games Team competition at the North Central Branch Entomological Society of America meetings.

Tiffany Heng-Moss was awarded second place for her master poster presentation at the North Central Branch Entomological Society of America meetings; a Mary and Charles C. Cooper/Emma I. Sharpless Fellowship from the College of Agricultural Sciences and Natural Resources and the Agricultural Research Division; a Mabel J. Reichenbach Fellowship from the Office of Graduate Studies; and was on the second-place team in the Linnaean Games Team competition at the North Central Branch Entomological Society of America meetings.

William Wyatt Hoback received a Milton E. Mohr Fellowship; was awarded first place for his poster presentation and was on the second-place team in the Linnaean Games Team competition at the North Central Branch Entomological Society of America meetings.

Thomas Hunt received a Widman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

Pari Pachamuthu received a Ward A. and Helen W. Combs Scholarship sponsored by Presto-X Company.

Mario Urias-Lopez received a scholarship from Pioneer Hi-Bred International, Inc.

Food Science and Technology

Doug Christensen received the Institute of Food Technologists Graduate Fellowship.

Brenda Waite received the Institute of Food Technologists Graduate Fellowship.

Horticulture

Kevin W. Frank received the Mary and Charles C. Cooper/Emma I. Sharpless Fellowship from the College of Agricultural Sciences and Natural Resources and the Agricultural Research Division; the Bukey Memorial Fellowship from the University of Nebraska Graduate College; and the Donald Walters Miller Fellowship from the University of Nebraska Foundation.

C. Rebecca W. Wynne received the Mary and Charles C. Cooper/Emma I. Sharpless Fellowship from the College of Agricultural Sciences and Natural Resources and the Agricultural Research Division.

Veterinary and Biomedical Sciences

Laxminarayana Devireddy received the Widman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.

Nagendra Hegde received the Joseph J. Garbarino Achievement Award from the Animal Health Institute Foundation.

Christina Topliff received the American College of Veterinary Microbiologists Outstanding Graduate Student Presentation award at the Conference of Research Workers in Animal Disease.

M. Teresa Winkler received an NIH grant to attend the 22nd International Herpesvirus Workshop.

Nutritional Science and Dietetics

Yi Wu received the Widman Trust Distinguished Graduate Assistant Award from the Agricultural Research Division.
The purpose of this new program is to allow outstanding University Honors Program students to conduct research under the direction of a faculty mentor. The program is open to junior and senior Honors Program participants proposing to work with a faculty member who has an ARD appointment. A subcommittee of the ARD Advisory Council selects awardees based on the quality of the proposal. Proposals are authored by the students with guidance from the proposed project mentors.

Agricultural Economics


David Drozd. The impacts of large hog confinement use. (J.C. Allen, Advisor)

Wade Johnson. The social and economic impact of the proposed highway construction and potential business development north of Columbus, Nebraska on agricultural producers and rural residents. (J.C. Allen, Advisor)

Animal Science

Edward Cargill. Chromosome location of a recessive cataract mutation in mice. (M.K. Nielsen and D. Pomp, Advisors)

Carin Ramsel. Acylation stimulating protein and fat synthesis in pig. (J.L. Minor, Advisor)

Jennifer L. Strickland. Effect of selection for energy expenditure on brown adipose tissue function in mice. (J.L. Minor, Advisor)

Biochemistry

Amy Lawson. A molecular-based examination of some of the factors affecting cellulose degradation by Ruminococcus albus. (M. Morrison, Advisor)

Carolyn M. O'Brien. Interactions between rubisco and rubisco activase. (R.J. Spreitzer, Advisor)

Biological Systems Engineering

Mark C. Stone. The evaluation of a constructed wetland system for rural-residence wastewater treatments in Nebraska. (W.E. Woldt and D.D. Schulte, Advisors)

Center for Biotechnology

Colleen Marion. Investigating the signal transduction properties of a novel maize gene using plant transformation and recombination technology. (G. Sarath, Advisor)

Aaron J. Saathoff. Development of an assay for detection and purification of sequence-specific peptidases. (R.E. Bellinger and G. Sarath, Advisors)

Food Science and Technology

Lacey Johannes. Transfer of potentially hazardous peanut proteins during roasting. (S.F. Hefle, Advisor)

April Elizabeth Kester. Application of capillary electrophoresis to the analysis of antioxidants in foods. (M.G. Zeece, Advisor)

School of Natural Resource Sciences

Thomas L. Dredla IV. Water analysis of mosquito breeding habitats and correlation to western equine encephalitis virus. (K.D. Hoagland, Advisor)

Randy Stotler. Pleistocene recharge of Dakota aquifer in northeast Nebraska. (D.C. Gosselin, Advisor)

Veterinary and Biomedical Sciences

Mary Nabity. Determination of the relationship between virulence and cDNA sequence of the fusion protein of bovine respiratory syncytial virus. (C. Kelling, Advisor)

Sara Tebbe. Analysis of the biochemical and morphological changes in the new genetic juvenile cataract husker mouse lens. (M.F. Lou, Advisor)
Ard faculty involved in plant breeding and genetics research make important contributions to the improvement and development of agricultural and horticultural crops. Public breeding programs such as ARD’s are essential to the continued enhancement of plant germplasm. These programs provide the resources and flexibility to pursue long-term breeding programs in crops that may not have a current commercial interest. They also can address genetic, cultural and management interactions characteristic of today’s agriculture, as well as the future’s.

Germplasm releases provide improved genetic material that is integrated into private and public plant breeding programs. Other releases occur as new cultivars (varieties), which are increased through the Foundation Seed Division and then provided to seed companies for production of certified seed. The following releases were made in 1997.

**Agronomy**

<table>
<thead>
<tr>
<th>Crop</th>
<th>Germplasm Release</th>
<th>Scientists</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn (Zea mays L.)</td>
<td>N546</td>
<td>B. Johnson and S. Rodriguez-Herrera</td>
<td>N546, a yellow endosperm maize parental line, originated from a population synthesized from three diverse populations. The line is expected to make contributions to breeding programs for which objectives include breeding for productivity under rain-fed or limited irrigation conditions, and to have utility in maize breeding projects for which breeding objectives include increasing genetic diversity of yellow maize. It is believed N546 carries the brachytic br2 gene. Leaves are dark green, relatively broad, and are semi-erect. N546 is not abnormally short, approximately 72% the height of B73, with ear attachment at mid-plant. Requires two to three fewer days to pollen shed than does B73, with silk emergence beginning approximately two days after pollen shed begins. Ears are ghyth and enclosed in a relatively tight husk. Grain color is light yellow. Cb color is white. Hybrid progeny of N546 have consistently exhibited good agronomic performance, particularly when evaluated in less productive, non-irrigated environments. Hybrids produced using N546 are best adapted to central and eastern Nebraska, and east into the central Corn Belt. It has not been evaluated for resistance to specific pathogens or insects.</td>
</tr>
<tr>
<td>Grain Sorghum [Sorghum bicolor (L.) Moench]</td>
<td>NP39R</td>
<td>J.D. Eastin, P.T. Nordquist, D.T. Rosenow, C. Woodfin, R.R. Duncan, F.R. Miller, M.W. Witt, and F. Zavala</td>
<td>NP39R is a tan, stress resistant sorghum. Population NP39R was derived from a TP24R germplasm base. Traits of value in NP39R are (1) availability of a Great Plains adapted germplasm pool of tan plants with light colored seeds to enhance export marketability for poultry feed, and (2) availability of improved preanthesis stress resistance in sorghum in general and specifically in tan plant germplasm. NP39R has an average height of 109 cm and a mean bloom date range from August 9 to 21. The population is well adapted for selection purposes in the U.S. Great Plains.</td>
</tr>
<tr>
<td>Forage Pearl Millet [Pennisetum glaucum (L.) R.Br.]</td>
<td>NFPM-1</td>
<td>J.F. Rajewski, D.J. Andrews, S. Appa Rao, J. Pedersen, B. Anderson, B. Stgemeier, G. Cuomo, and G. Burton</td>
<td>NFPM-1 has prolific tillering ability in both short-day and long-day environments and produces medium width long leaves and thin to medium stems. Performance tests indicate it is an excellent pollinator parent in combination with non-photoperiod sensitive seed parents for producing high yielding non-flowering forage hybrids in long day length environments. Protein levels are higher than forage sorghum hybrids and are equivalent to that of other pearl millet forages tested. NFPM-1 has not been evaluated for pest or disease resistance. Field observations in eastern Nebraska indicated that NFPM-1 has some tolerance to heavy chinchbug infestations as regrowth begins following a late July forage harvest.</td>
</tr>
</tbody>
</table>
Crop: Sudangrass [Sorghum bicolor (L.) Moench]

Germplasm Release: A3N242 (A3 GREENLEAF) and A3N243 (A3PIPER) Sudangrass

Scientists: J.F. Pedersen and J.J. Toy

Released By: United States Department of Agriculture Agricultural Research Service and the University of Nebraska Agricultural Research Division

Characteristics: These genetic stocks are based on two widely utilized sudangrass cultivars and are the first sudangrasses released in A3 cytoplasm. They have immediate application for research involving sudangrass with A3 cytoplasm and as seed parent lines for producing F1 sudangrass hybrids. Use of these lines directly or in hybrid combination should usually produce male sterile plants. In agricultural use, such plants may reduce the threat of producing male fertile seed from out crossing with weedy sorghum and may have superior forage quality. They have immediate application for use as testers of combine height sorghum seed parent lines for use in commercial production of sorghum x sudangrass hybrids. Reaction of these genetic stocks to specific insects or diseases has not been determined.

Crop: Hard Red Winter Wheat [Triticum aestivum (L.) em Theil]

Variety Name: Windstar


Released By: The University of Nebraska Agricultural Research Division, the United States Department of Agriculture, Agricultural Research Service, Northern Plains Region, and the South Dakota State University Agricultural Experiment Station

Characteristics: 'Windstar' is an increase of a hard red winter wheat F₆ derived line from the cross TX79A2729/Caldwell/Brule field sel #63/1 Siouxsand which was made in 1984 by Dr. J.W. Schmidt. Windstar is an awned, white-glummed cultivar. The canopy is moderately open and upright. The flag leaf is erect and twisted at boot stage. The foliage is blue-green with a waxy bloom at anthesis. The leaf is pubescent. The spike is tapering in shape, moderately long to long, and middense. The glume is short to midlong and narrow to midwide, and the glume shoulder is sloping to square. The beak is moderately short to medium with an acuminate tip. The spike is held erect to inclined at maturity and the glumes and straw have a golden color. Kernels are red colored, hard textured, and ovate. The kernel has no collar, rounded cheeks, midsize germ, midsize brush of medium length, and a narrow and shallow crease. Windstar has moderately strong straw strength. It has exhibited moderate resistance to stem rust and moderate susceptibility to leaf rust and wheat streak mosaic virus. It is susceptible to the Russian wheat aphid and the Great Plains biotype of Hessian fly and to soilborne mosaic virus. The recommended growing area for Windstar is the dryland wheat production areas of the Panhandle of Nebraska and western South Dakota. The overall and end-use quality characteristics should be acceptable to the milling and baking industries.

Horticulture

Crop: Winter Squash: Butternut type (Cucurbita moschata Duch. Ex Poir)

Variety: Butter Bowl

Scientists: D.P. Coyne, J.M. Reiser, D. Smith, L. Sutton, D. Lindgren, and A.M. Ibrahim

Characteristics: Butter bowl is a novel, small sized, flavorful, early maturing, near-obl ate butternut type winter squash variety. It was derived from a cross of two true breeding crookneck lines. It is suitable for small gardens with limited space due to its compact plant habit. It is resistant to bacterial spot, black fruit rot, and vine borer while it is moderately susceptible to powdery mildew. The fruit cooks uniformly in a microwave oven due to its more uniform flesh thickness.

West Central Research and Extension Center

Crop: Penstemon (Penstemon grandiflorus Nutt.)

Variety Release: 'Prairie Palette'

Scientists: D.T. Lindgren and D.M. Schaaf

Characteristics: A short-lived native plant of the central U.S.A.. This selection is different from the native populations in that it contains a wide range of flower colors not normally found in this species. It is a seed propagated selection intended for uses along highway right-of-ways in prairie plantings.
Copyrights and Patents

Copyright and patent protection is an important parameter in research. It is especially important for discoveries and innovations which have a potential commercial application. Therefore, from time to time, the ARD (and the University) may determine that the public good is best served with regard to technology transfer by entering into an agreement with a public or private institution which provides that institution with proprietary interests in specific research. The research of ARD scientists often can lead to a patent. Most of the patents that have been awarded to ARD scientists have been for equipment developments and specialized processes. These patents often are licensed by private industry, with royalties being reinvested in future ARD research. The following copyright and patents were awarded in 1997.

Agronomy

Copyright Title: WeedSOFT


Description: WeedSOFT SM is an easy to use decision-aid computer program developed to provide information in pre-emergent, post-emergent or total weed management planning. It is comprised of four separate programs; ADVISOR - a bioeconomic decision model, EnviroFX - groundwater risk assessment, MappVIEW - groundwater vulnerability of counties in Nebraska, and WeedView - weed identification.

Plant Pathology

Patent Title: Hybrid RNA virus

Patent Number: 5,602,242

Scientists: Paul G. Ahlquist (University of Wisconsin-Madison), Roy C. French (United States Department of Agriculture, Agricultural Research Service), and Robert F. Sacher (University of Wisconsin-Madison)

Description: A recombinant RNA virus is provided allowing encapsidation of genetically engineered viral sequences in heterologous protein capsids. This invention allows the size of recombinant virus RNA components to be altered. Methods of making and using such recombinant viruses are also provided, specifically with respect to the transfection of plants to bring about genotypic and phenotypic changes.

Patent Title: Hybrid RNA virus

Patent Number: 5,627,060

Scientists: Paul G. Ahlquist (University of Wisconsin-Madison), Roy C. French (United States Department of Agriculture, Agricultural Research Service), and Robert F. Sacher (University of Wisconsin-Madison)

Description: A recombinant RNA virus is provided allowing encapsidation of genetically engineered viral sequences in heterologous, preferably rod-shaped coat, protein capsids. Since icosahedral viruses are limited in the amount of RNA they can carry, and rod-shaped viruses are expandable, this invention allows the size of recombinant virus RNA components to be increased (or decreased).
<table>
<thead>
<tr>
<th>Patent Title</th>
<th>Plant tissue comprising a subgenomic promoter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patent Number</td>
<td>5,633,447</td>
</tr>
<tr>
<td>Scientists</td>
<td>Paul G. Ahlquist (University of Wisconsin-Madison) and Roy C. French (United States Department of Agriculture, Agricultural Research Service)</td>
</tr>
<tr>
<td>Description</td>
<td>A subgenomic promoter of a positive strand RNA virus is disclosed which directs the expression of a structural gene. The core region and an upstream activating domain of the subgenomic promoter are identified. This promoter can be utilized in appropriate engineered recombinant DNA derivative which may be chromosomally integrated or maintained as an episome in transformed cells.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patent Title</th>
<th>Subgenomic promoter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patent Number</td>
<td>5,670,353</td>
</tr>
<tr>
<td>Scientists</td>
<td>Paul G. Ahlquist (University of Wisconsin-Madison) and Roy C. French (United States Department of Agriculture, Agricultural Research Service)</td>
</tr>
<tr>
<td>Description</td>
<td>A subgenomic promoter of a positive strand RNA virus is disclosed that directs the amplified expression of a structural gene in plant tissue. The core region and an upstream activating domain of the subgenomic promoter are identified. This promoter can be utilized in a modified virus to provide regulated expression of foreign genes in plant cells.</td>
</tr>
</tbody>
</table>
ARD is one of five divisions within the Institute of Agriculture and Natural Resources (IANR) at the University of Nebraska. IANR was established by the Nebraska legislature in 1973 and has its headquarters on the University of Nebraska-Lincoln East Campus. The University of Nebraska system has four campuses: University of Nebraska-Lincoln, University of Nebraska Medical Center, University of Nebraska at Omaha and the University of Nebraska at Kearney. The University of Nebraska system is governed by an elected Board of Regents and administered by a system and campus administration.

Administrative Personnel
(June 1998)

University of Nebraska
Board of Regents

Robert M. Allen, Hastings
Don S. Blank, McCook
Chuck Hassebrook, Walthill
Drew Miller, Papillion
Nancy O'Brien, Waterloo
John W. Payne, Kearney
Rosemary Skrupa, Omaha
Charles S. Wilson, Lincoln

Student Regents

UNMC — Julie Chase
UNO — Joseph Sanchez
UNL — Sara Russell
UNK — Jennifer Kruse

Administrative Officers

L. Dennis Smith, President, University of Nebraska
James C. Moeser, Chancellor, University of Nebraska-Lincoln
Irvin T. Omtvedt, Vice Chancellor, Institute of Agriculture and Natural Resources; Vice Chancellor, Extended Education and Vice President, University of Nebraska

Agricultural Research Division

Darrell W. Nelson, Dean and Director
Dale H. Vanderholm, Associate Dean and Director
Karen E. Craig, Assistant Director/Human Resources and Family Sciences
Steven S. Waller, Assistant Dean and Director
Shripat Kamble\(^1\), Administrative Intern
Dora Dill, Administrative Technician
Diane Mohrhoff, Project Assistant
Nelvie Lienemann, Staff Secretary II
Mary Jacobs\(^1\), Temporary/On Call

\(^1\)Temporary appointment
Organizational Chart

Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
June 1998

Vice Chancellor
Irvin T. Omtvedt

Interim Associate Vice Chancellor
Glen Vollmar

Assistant Vice Chancellor
Finance and Personnel
Alan R. Moeller

Dean
Agricultural Research Division
Darrell W. Nelson*

Dean
College of Agricultural Sciences and Natural Resources
Donald M. Edwards

Dean
College of Human Resources and Family Sciences (IANR Research and Extension)
Karen E. Craig

Dean
Cooperative Extension Division
Kenneth R. Bolen**

Director
Conservation and Survey Division
Perry B. Wigley

Interim Dean
International Programs
John Foster

*Director, Nebraska Agricultural Experiment Station
**Director, University of Nebraska Cooperative Extension
Administrative Units Reporting to ARD
Institute of Agriculture and Natural Resources
The University of Nebraska — Lincoln
June 1998

Agricultural/Natural Resources Units

Agricultural Economics
Gary Lynne, Head

Agricultural Leadership, Education and Communication
Earl Russell, Head

Agronomy
Kenneth Cassman, Head

Animal Science
Elton Aberle¹, Head
Roger Mandigo², Interim Head

Biochemistry
Robert Klucas, Head

Biological Systems Engineering
Glenn Hoffman, Head

Biometry
Anne Parkhurst, Head

Entomology
Sharron Quisenberry, Head

Food Science and Technology
Steve Taylor, Head

Horticulture
Paul Read¹, Head
David Lewis², Head

Plant Pathology
Anne Vidaver, Head

School of Natural Resource Sciences
Blaine Blad, Director

Veterinary and Biomedical Sciences
Jack Schmitz

Human Resources and Family Sciences Departments

Family and Consumer Sciences
Shirley Baugher, Chair

Nutritional Science and Dietetics
Marilynn Schnepf, Chair

Textiles, Clothing and Design
Rita Kean, Chair

Off-Campus Research Centers

Agricultural Research and Development Center
Ithaca—Daniel Duncan, Director

Northeast Research and Extension Center
Concord—Robert Fritschén¹, Director
John Witkowski², Director

Panhandle Research and Extension Center
Scottsbluff—Charles Hibberd, Director

South Central Research and Extension Center
Clay Center—Charles Stonecipher¹, Director
Alan Baquet², Director

Southeast Research and Extension Center
Lincoln—Randy Cantrell, Director

West Central Research and Extension Center
North Platte—Pete Jacoby¹, Director
Gary Hergert², Director

Biotechnology Center
Anne Vidaver, Director

Food Processing Center
Steve Taylor, Director

Center for Grassland Studies
Martin Massengale, Director

Great Plains Regional Center for Global Environmental Change
William Easterling¹, Director
Shashi Verma², Director

Industrial Agricultural Products Center
Milford Hanna, Director

Center for Rural Community Revitalization and Development
Sam Cordes, Director

Center for Sustainable Agricultural Systems
Chuck Francis, Director

Water Center/Environmental Programs
Bob Volk, Director

IANR Communications and Information Technology
Dan Cotton, Director

¹Ended appointment during 1997-1998
²Began appointment during 1997-1998
Research by Agricultural Research Division researchers is conducted across the state. Sites include:

- Agricultural Research and Development Center — Ithaca
- Dalbey-Halleck Farm — Virginia
- Genoa Foundation Seed Farm — Genoa
- Gudmundsen Sandhills Laboratory — Whitman
- Haskell Agricultural Laboratory — Concord
- High Plains Agricultural Laboratory — Sidney
- Horning Forestry Farm — Plattsmouth
- Northeast Research and Extension Center — Norfolk
- Panhandle Research and Extension Center — Scottsbluff
- South Central Research and Extension Center, Great Plains Veterinary Educational Center, and the U.S. Meat Animal Research Center (USDA) — Clay Center
- Southeast Research and Extension Center — Lincoln
- West Central Research and Extension Center — North Platte
Approximately 334 faculty members have research appointments in ARD. Most have joint appointments, with teaching or extension responsibilities as well. Some faculty have responsibilities other than ARD research (rsch), extension (ext) or teaching (tch). Administrative appointments, as well as appointments with centers and other UNL units or with the USDA Agricultural Research Service (other), also are noted here.

The School of Natural Resource Sciences was formed in August 1997. The School was formed from the merger of the Department of Agricultural Meteorology; Department of Forestry, Fisheries and Wildlife and the Water Center/Environmental Programs. In addition, several faculty from other units within the University transferred all or part of their appointment to the School.

The ARD programs depend on many linkages and cooperative arrangements in order to make the most effective use of limited resources and to address problems of mutual interest. The USDA Agricultural Research Service (ARS) has about 25 scientists located on the UNL campus. Historically there has been a very close working relationship between these scientists, all holding adjunct faculty status, and UNL faculty. Four departments contain ARS scientists: the Departments of Agronomy, Entomology, Plant Pathology and Biological Systems Engineering. ARS scientists are noted as USDA in the other category.

UNL scientists also cooperate closely with many ARS faculty at the Roman L. Hruska Meat Animal Research Center (MARC) at Clay Center, Nebraska. There are about 50 scientists at the MARC facility, many of whom also hold UNL faculty status in the Department of Animal Science. MARC scientists are noted as USDA in the other category.

Another federal facility located on campus is the U.S. Forest Service National Agroforestry Center. USFS scientists also work closely with UNL faculty and hold adjunct faculty status. The Departments of Entomology and Forestry, Fisheries and Wildlife have adjunct faculty noted as USDA in the other category.

The USDA Natural Resources Conservation Service has personnel located in UNL facilities at the West Central Research and Extension Center, North Platte. The NRCS professional personnel there as well as those at the federal center, Lincoln, work closely with ARD faculty on a number of natural resources related activities.

The Department of Animal Science has a unique relationship with its industry supporters. Several industry representatives also hold adjunct appointments in the department and are noted as industry in the other category.

The percentages listed represent the proportion of a faculty member’s time assigned to each function. The primary research responsibility is identified for each. All ARD off-campus personnel who are located at Centers are associated with an on-campus department as well [Department/Area of Responsibility].
# Agricultural/Natural Resources Units

## Agricultural Economics

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## Agricultural Leadership, Education and Communication

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**Biological Systems Engineering**

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2. Began research appointment during 1997-1998
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### Textiles, Clothing and Design

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### Off-Campus Research Centers

#### Northeast Research and Extension Center

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1. Ended research appointment during 1997-1998
2. Began research appointment during 1997-1998
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†Professorial appointment as of January 1, 2011

For more information, please visit the University of Georgia's website.
### West Central Research and Extension Center

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### Interdisciplinary Activities

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#### Agricultural Research Division

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¹Ended research appointment during 1997-1998
²Began research appointment during 1997-1998
³Began interim director appointment during 1997-1998
⁴Began interim associate director appointment during 1997-1998
The Agricultural Research Division hosted 30 visiting scientists and 53 research associates to the campus in 1997-1998. ARD research is complemented and enhanced by these collaborating scientists—it is through the sharing of knowledge and expertise that the field of science is advanced.

Visiting Scientists

Agronomy

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<th>Country</th>
<th>Expertise/Discipline</th>
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<td>Dr. Michele Ariezo</td>
<td>Italy</td>
<td>Remediation of soil and water by advanced oxidation technologies</td>
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<tr>
<td>Anna Gajda</td>
<td>Poland</td>
<td>Soil microbiology</td>
</tr>
<tr>
<td>Dr. Ruidong Huang</td>
<td>China</td>
<td>Sorghum mineral nutrition and environmental stress</td>
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<tr>
<td>Mr. S. A. Ipinge</td>
<td>Namibia</td>
<td>Pearl millet breeding</td>
</tr>
<tr>
<td>Mr. Peter Juroszek</td>
<td>Germany</td>
<td>Weed spatial heterogeneity and population processes</td>
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<tr>
<td>Dr. Kedar Nath Rai</td>
<td>India</td>
<td>Pearl millet breeding research</td>
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Animal Science

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<td>Seong-Bok Choi</td>
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<td>William Fulton</td>
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<td>Shylaja Jagannatha</td>
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<td>Agnes Janosa</td>
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<td>Emad Fahmy Ahmed Mousa</td>
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<td>Hayrettin Okut</td>
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<td>Gary Snowder</td>
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<tr>
<td>Akio Tamai</td>
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### Entomology

**Visiting Scientist:** Jan Chirico  
**Country:** Sweden  
**Expertise/Discipline:** Veterinary entomology and parasitology

### Plant Pathology

**Visiting Scientist:** Dr. Nazira Aytkhozhina  
**Country:** Kazakhstan  
**Expertise/Discipline:** Microbiology

**Visiting Scientist:** Dr. Shin-Churl Bae  
**Country:** Korea  
**Expertise/Discipline:** Molecular biology

**Visiting Scientist:** Dr. Graciela Godoy-Lutz  
**Country:** Dominican Republic  
**Expertise/Discipline:** Plant pathology

### Veterinary and Biomedical Sciences

**Visiting Scientist:** Seung Ki Chon  
**Country:** South Korea  
**Expertise/Discipline:** Virology

**Visiting Scientist:** David Barcellos  
**Country:** Brazil  
**Expertise/Discipline:** Veterinary medicine

**Visiting Scientist:** Sonia Estella  
**Country:** Argentina  
**Expertise/Discipline:** Pathology

**Visiting Scientist:** Leticia Garcia  
**Country:** Mexico  
**Expertise/Discipline:** Bacteriology

**Visiting Scientist:** Ana Maria Jar  
**Country:** Argentina  
**Expertise/Discipline:** Immunology

### Northeast Research and Extension Center

**Visiting Scientist:** John B. Gaughan  
**Country:** Australia  
**Expertise/Discipline:** Animal production

### Research Associates

#### Agronomy

**Research Associate:** John B. Gaughan  
**Country:** Nebraska, USA  
**Expertise/Discipline:** Animal production

**Research Associate:** Jongil Chung  
**Country:** Nebraska, USA  
**Expertise/Discipline:** PCR-based RAPD marker technology

**Research Associate:** Dennis Francis  
**Country:** Nebraska, USA  
**Expertise/Discipline:** Soil and water science

**Research Associate:** Daniel Hagopian  
**Country:** Maine, USA  
**Expertise/Discipline:** Using remote sensing to detect nutrient deficiency in crops

**Research Associate:** Kathleen Heuss-Larosa  
**Country:** Nebraska, USA  
**Expertise/Discipline:** Analysis of gene expression in transformed plants

**Research Associate:** Fabien Jeutong  
**Country:** Nebraska, USA  
**Expertise/Discipline:** Male sterility systems in pearl millet hybrids

**Research Associate:** Jai Heon Lee  
**Country:** Nebraska, USA  
**Expertise/Discipline:** Wheat transformations

**Research Associate:** Zhengming Li  
**Country:** Nebraska, USA  
**Expertise/Discipline:** Environmental remediation of organo-nitrogen contaminants in soil and water

**Research Associate:** Chris Neese  
**Country:** Guelph, Canada  
**Expertise/Discipline:** Plant patch dynamics to address weed problems in managed agroecosystems.

**Research Associate:** Brian Rector  
**Country:** Georgia, USA  
**Expertise/Discipline:** Genetic mapping of soybean traits

**Research Associate:** Galina Vaslyeva  
**Country:** Pennsylvania, USA  
**Expertise/Discipline:** Environmental remediation of organo-nitrogen contaminants in water and soil

**Research Associate:** Charles Yamoah  
**Country:** Ghana  
**Expertise/Discipline:** Modeling agronomic rotation projects

**Research Associate:** Zhanyuan Zhang  
**Country:** Nebraska, USA  
**Expertise/Discipline:** Attempts to improve efficiency of soybean transformation
### Animal Science

<table>
<thead>
<tr>
<th>Research Associate</th>
<th>State/Country</th>
<th>Expertise/Discipline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nicolas C. Heng</td>
<td>New Zealand</td>
<td>Molecular microbiology</td>
</tr>
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</table>

### Biochemistry

<table>
<thead>
<tr>
<th>Research Associate</th>
<th>State/Country</th>
<th>Expertise/Discipline</th>
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<tbody>
<tr>
<td>Mohammad Anwaruzzaman</td>
<td>Bangladesh</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Alexander Arendsen</td>
<td>Netherlands</td>
<td>Protein/chemistry</td>
</tr>
<tr>
<td>Sarbani Chakraborty</td>
<td>India</td>
<td>Molecular genetics</td>
</tr>
<tr>
<td>Shantanu Chowdhury</td>
<td>India</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Yu-Chung Du</td>
<td>China</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Konstantin Korotkov</td>
<td>Russia</td>
<td>Biochemistry</td>
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<tr>
<td>Nilesh Maiti</td>
<td>India</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Devendra Naidu</td>
<td>India</td>
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<tr>
<td>Kushal Qamungo</td>
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<tr>
<td>Javier Seravalli</td>
<td>Spain</td>
<td>Protein sequencing</td>
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<tr>
<td>Shinichi Taoka</td>
<td>Japan</td>
<td>Enzyme mechanisms</td>
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<tr>
<td>Jianmin Wu</td>
<td>China</td>
<td>Molecular biology</td>
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### Biological Systems Engineering

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<tr>
<th>Research Associate</th>
<th>State/Country</th>
<th>Expertise/Discipline</th>
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<tbody>
<tr>
<td>Ersoy Yildirim</td>
<td>Nebraska/USA</td>
<td>Geographical information systems, irrigation engineering</td>
</tr>
<tr>
<td>Daneal Fekersillassie</td>
<td>Nebraska/USA</td>
<td>Irrigation engineering</td>
</tr>
<tr>
<td>Anantha Kollengode</td>
<td>Nebraska/USA</td>
<td>Process engineering</td>
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### Food Science and Technology

<table>
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<tr>
<th>Research Associate</th>
<th>State/Country</th>
<th>Expertise/Discipline</th>
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<tbody>
<tr>
<td>Soo-Hyan Chung</td>
<td>Korea</td>
<td>Food mycology/mycotoxins</td>
</tr>
<tr>
<td>Andrea Fadeev</td>
<td>Russia</td>
<td>Fermentation biochemistry</td>
</tr>
<tr>
<td>Jason Hlywka</td>
<td>Canada</td>
<td>Food toxicology/immunology</td>
</tr>
<tr>
<td>Jicai Huang</td>
<td>China</td>
<td>Fermentation biochemistry</td>
</tr>
<tr>
<td>Jack Kelly</td>
<td>Nicaragua</td>
<td>Food biochemistry/immunology</td>
</tr>
<tr>
<td>Murthy Mangalampalli</td>
<td>India</td>
<td>Dairy product processing</td>
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<tr>
<td>Celestin Munimbazi</td>
<td>Burundi</td>
<td>Food mycology/mycotoxins</td>
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<tr>
<td>Deepak Sahai</td>
<td>India</td>
<td>Cereal chemistry and processing</td>
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<tr>
<td>Wen Hui Zhang</td>
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<td>Fermentation biochemistry</td>
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### Plant Pathology

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<tr>
<th>Research Associate</th>
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<tbody>
<tr>
<td>Tony Buhr</td>
<td>Nebraska/USA</td>
<td>Plant molecular biology</td>
</tr>
<tr>
<td>II-Rong Choi</td>
<td>Kentucky/USA</td>
<td>Plant virology</td>
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<tr>
<td>Mike Graves</td>
<td>Oregon/USA</td>
<td>Molecular virology</td>
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<tr>
<td>Chongxi Huang</td>
<td>China</td>
<td>Molecular biology</td>
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<tr>
<td>Jeff Rollins</td>
<td>Indiana/USA</td>
<td>Fungal molecular genetics</td>
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<tr>
<td>Chidananda Sulli</td>
<td>India</td>
<td>Plant molecular biology</td>
</tr>
<tr>
<td>Allen Szalanski</td>
<td>Nebraska/USA</td>
<td>Nematode molecular systematics</td>
</tr>
<tr>
<td>Lingyu Zhang</td>
<td>China</td>
<td>Wheat transformation</td>
</tr>
<tr>
<td>Yange Zhang</td>
<td>China</td>
<td>Molecular biology</td>
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### Veterinary and Biomedical Sciences

<table>
<thead>
<tr>
<th>Research Associate</th>
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<tbody>
<tr>
<td>Tony Buhr</td>
<td>Nebraska/USA</td>
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### School of Natural Resource Sciences

<table>
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<tr>
<th>Research Associate</th>
<th>State/Country:</th>
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<tbody>
<tr>
<td>Zhengming Li</td>
<td>Nebraska/USA</td>
<td>Environmental remediation of organo-nitrogen contaminants in soil and water</td>
</tr>
<tr>
<td>Galina Vassileva</td>
<td>Russia</td>
<td>Environmental remediation of organo-nitrogen contaminants in water and soil</td>
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<th>Research Associate</th>
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<tbody>
<tr>
<td>Emil Berberov</td>
<td>Bulgaria</td>
<td>Microbiology</td>
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<tr>
<td>Sandra Fernandez</td>
<td>Argentina</td>
<td>Microbiology</td>
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<tr>
<td>J.J. Hovde</td>
<td>North Dakota/USA</td>
<td>Large animal veterinary medicine</td>
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<tr>
<td>Yunquan Jiang</td>
<td>China</td>
<td>Biochemistry protein/purification and virology</td>
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<tr>
<td>Nelson Lezcano</td>
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<td>Neurobiology</td>
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<td>Daniel Perez</td>
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<td>Chuang Qin</td>
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<td>Cataract/eye disease</td>
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<td>Nalini Raghavaehari</td>
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<td>Biochemistry</td>
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<td>Loren Schultz</td>
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<td>Jung-Hyang Sur</td>
<td>South Korea</td>
<td>Immunology/virology</td>
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<td>Ventzislav Vassilev</td>
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<td>Molecular biology</td>
</tr>
<tr>
<td>Yange Zhang</td>
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<td>Molecular biology</td>
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</table>
Research Projects

Each faculty member with an ARD appointment has a federally-approved research project. A number of faculty have multiple projects. There are 394 research projects that were active for all or part of the 1997-1998 fiscal year in agriculture, natural resources and family sciences. Projects are generally three to five years in duration. Faculty also are part of a national network of Agricultural Experiment Station scientists located at Land Grant Universities across the United States. ARD researchers currently are involved with about 51 regional projects in which they conduct cooperative research with scientists at other universities, addressing problems of regional and national importance. They also participate in approximately 65 regional research committees which serve to exchange information and coordinate cooperative research activities among institutions.

Research projects are listed by departments. An asterisk (*) indicates that the project was discontinued in fiscal year 1997-1998.

You will note codes following the project number. The codes reveal the type of project.

<table>
<thead>
<tr>
<th>Type</th>
<th>Funding Source</th>
<th>Code</th>
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<tbody>
<tr>
<td>Hatch</td>
<td>Federal and State Funds</td>
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<td>Federal Funds</td>
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<tr>
<td>Hatch</td>
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<tr>
<td>Hatch</td>
<td>Federal Funds</td>
<td>ms</td>
</tr>
<tr>
<td>Hatch</td>
<td>Federal, State, Public and Private</td>
<td>sg</td>
</tr>
<tr>
<td>Hatch</td>
<td>Federal Funds/USDA</td>
<td>cg</td>
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<tr>
<td>Hatch</td>
<td>Federal Funds</td>
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<tr>
<td>Hatch</td>
<td>McIntire-Stennis: research relating to: 1) reforestation and management of land for the production of timber and other related products of the forest; 2) management of forest and related watershed lands to improve conditions of water flow and to protect resources against floods and erosion; 3) management of forest and related rangeland for production of forage for domestic livestock and game and improvement of food and habitat for wildlife; 4) management of forest lands for outdoor recreation; 5) protection of forest land and resources against fire, insects, diseases, or other destructive agents; 6) utilization of wood and other forest products; 7) development of sound policies for the management of forest lands and the harvesting and marketing of forest products; and 8) such other studies as may be necessary to obtain the fullest and most effective use of forest resources.</td>
<td>McIntire-Stennis</td>
</tr>
<tr>
<td>Hatch</td>
<td>Special Grants: targeted research projects to address special needs for family sciences, agriculture and the management of natural resources for Nebraska.</td>
<td>Special Grants</td>
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<tr>
<td>Hatch</td>
<td>Competitive Grants: includes research in USDA national priority areas.</td>
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<tr>
<td>Hatch</td>
<td>Animal Health: research to promote the general welfare through improved health and productivity of domestic livestock, poultry, aquatic animals, and other income-producing animals that are essential to the nation’s food supply and the welfare of producers and consumers of animal products.</td>
<td>Animal Health</td>
</tr>
</tbody>
</table>

Agricultural/Natural Resources Units

Agricultural Economics

10-106 | rr | Private strategies, public policies, and food system performance (A.M. Azzam) |
10-107 | | Factors affecting the evolution of world agricultural markets: implications for U.S. policy (E.W. F. Peterson) |
10-117 | ha | Economics of beef cattle management systems in Nebraska (G.H. Pfeiffer) |
10-120 | ha | Structure, efficiency, and viability of agribusiness organizations (J.S. Royer) |
10-121 | ha | Sustainable communities: community response to institutional change (J.C. Allen) |
10-124 | ha | Economic analysis of farm management and public policy alternatives for improving groundwater quality (R.J. Supalla, J.C. Allen) |
10-125 | ha | Impacts of policies related to water, commodity programs, and energy based inputs on Nebraska farms (G.A. Helmers, D.M. Conley, M.E. Baker) |
10-126 | | Impact analyses and decision strategies for agricultural research (R.K. Perrin) |
10-128 | ha | Economics, environment, and new agricultural technology (W.L. Miller) |
10-129 | | Structural changes in the U.S. grains and oilseeds marketing systems in a dynamic and global marketplace (D.M. Conley) |
10-130 | | Technical efficiency analysis for livestock and dairy operations in Nebraska (A.M. Azzam, S.M. Azzam) |
10-131 | ha | Selected input markets in agriculture: fuels price risk and tractor demand (D.M. Conley) |
10-132 | | Water conservation, competition and quality in western irrigated agriculture (R.J. Supalla) |
Agricultural Leadership, Education and Communication

*18-001 st
Dissemination of research information (T. Meisenbach)

24-031 st
Impacting agricultural literacy of elementary students and teachers through teacher workshops (O.S. Gilbertson)

*24-032 st
The determinants and uses of leadership influence in agriculture (F.W. Brown)

24-033 st
Distance education policy research: organization and administration (J.W. King, S.K. Rockwell, E.R. Russell)

24-034 st
Predictors of leader and follower behavior, and the impact of leadership development (J.E. Barbuto Jr., S. Fritz)

Agronomy

12-002 ha
Improvement and evaluation of oats and barley (P.S. Baenziger)

*12-011 ha
Changes in soil properties associated with changes in land use over the past century (D.T. Lewis)

12-055 ha
Genetics, breeding and evaluation of common wheat and triticale for Nebraska (P.S. Baenziger)

*12-072 rr
Introduction, multiplication, evaluation, preservation, cataloguing and utilization of plant germplasm (D. Balyensperger, K.P. Vogel)

*12-135 rr
Soil productivity and erosion (W.L. Powers)

12-149 st
Breeding sorghum and pearl millet for USA and developing countries (D.J. Andrews)

*12-151 ha
Tillage influence on crop production and physical properties of the soil surface and rhizosphere (A.J. Jones)

12-173 ha
Evaluating plant nutrient needs and product quality (K.D. Frank)

12-174 rr
Market quality of hard wheat for domestic and international foods (D.R. Shelton)

12-181 ha
Development of profitable reduced-herbicide weed management systems through integration (A.R. Martin)

*12-190 ha
Leafy spurge: analysis of genetic variation by cpDNA characterization (D.J. Lee, M.L. Rose)

12-193 ha
Investigating alternative grain and oil crops for Nebraska (L.A. Nelson)

12-194 ha
Novel methods for soybean genetic improvement and genomic analysis (J.E. Specht)

12-195 ha
Biometrical genetical, selection theory and methods and germplasm improvement in maize (B.E. Johnson)

12-197 ha
Tissue and cell physiology of sorghum (M.D. Clegg)

12-198 ha
Jasmonate regulated gene expression in soybean (P.E. Staswick)

12-199 ha
Herbage and livestock production potential from native warm-season grasses (B.E. Anderson, L.E. Moser)

12-201 st
Maintenance, increase and distribution of elite germplasm (R. Helsing)

12-202 st
Winter wheat germplasm enhancement and performance evaluation (C.J. Peterson, R.A. Graybosch)

12-203 ha
Flow of water and particles in soils and porous media (D. Balyensperger, K.P. Vogel)

12-204 rr
Biological and ecological basis for a weed management model to reduce herbicide use in corn (D.A. Mortensen, J.L. Lindquist)

12-207 ha
Maize production practice influence on grain and stover yield and quality (S.C. Mason)

*12-212 ha
Water relations, gas exchange and growth of plants and canopies (T.J. Arkebauer)

*12-213 ha
Resource efficient cropping systems for Nebraska (C.A. Francis)

12-215 st
Development of integrated weed management strategies to improve Great Plains and Midwest grasslands (R.A. Masters)

*12-217 st
Nutrient use efficiency in sorghum and pearl millet (J.W. Maranville)

*12-220 ha
Selecting wheat and other cereal grains for enhanced end-use performance characteristics (D.R. Shelton, P.S. Baenziger, C.J. Peterson, R.A. Graybosch)

*12-221 ha
Physiology, growth, and development of selected perennial forage grasses (I.E. Moser)

*12-222 ha
Physiological evaluation of cultural and genetic factors influencing seasonal and instantaneous WUE (J.D. Eastin)

12-224 ha
Soil and crop management effects on the nitrogen cycle (D.T. Walters)

12-225 ha
Studies on the mechanisms found in corn, sorghum and pearl millet which improve N uptake and use (J.W. Maranville)

12-226 st
Perennial forage grass breeding for Nebraska (K.P. Vogel)

*12-228 ha
Increasing fertilizer efficiency for grain crops (D.H. Sander)

*12-233 eg
Exploring the interface of qualitative and quantitative genetics (P.S. Baenziger, Y. Yen)

12-235 st
Influence of novel and alien genes on the end-use quality of hard winter wheat (R.A. Graybosch)

*12-236 eg
Events, processes and conditions influencing the stability of weed distributions (D.A. Mortensen, L.J. Young, A.R. Martin)

12-238 ha
Management for sustained production of perennial warm-season grasses (W.L. Schacht)

*12-240 eg
Chromosome-specific libraries for maize genome research (K. Arumuganathan)

12-241 ha
Ecological studies of Nebraska rangeland vegetation (J. Stubbenhock)

12-242 st
Defining and assessing basic indicators of soil quality and erodibility (J.W. Duran, J.E. Gilley, J.R. Ellis, G.E. Varvel)

12-243 ha
Weed distribution and demographic elucidating pest management principles for reducing herbicide use (D.A. Mortensen)

12-244 ha
Soil physical relationships for best management practices to protect water quality (W.L. Powers)

12-245 st

12-246 st
Efficient and environmentally sound conservation use of nutrients and C from animal manure (J.W. Duran, J.E. Gilley)

12-247 eg
An ecophysiology approach to understanding maize tolerance and weed suppressive ability (D.A. Mortensen, J.L. Lindquist, B.E. Johnson)

*12-248 eg
Measuring crop nitrogen status using on-the-go sensors (D. Francis)

12-249 st

*12-251 st
Integration of abiotic treatments with plant-based strategies for remediating soil contaminated with organonitrogen compounds (P.J. Shea, S.D. Comaft, G.L. Horst, R.A. Drijber, W.L. Powers, T. Zhang)
Biosolids application and soil chemical properties: changes in phosphorus and carbon pools (D. McCallister)

Characterizing nitrogen mineralization and availability in crop systems to protect water resources (D. H. Sander, D. T. Walters)

Community structure and functional diversity of soil microbial communities in natural and agroecosystems (R. A. Diehl)

Soybean breeding and genetic studies (G. E. Graef)

Stability of soil microbial communities under different agroecosystems (R. A. Diehl)

*12-257* Predicting chlorophyll content, crude protein content, plant structure, and developmental stage of smooth bromegrass and big bluestem (W. Schacht, L. Moser, L. Lunderback)

Nutrient management for maximizing nutrient use efficiency in sorghum (J. W. Maranville)

Assessment of genetic variation for end-use quality traits in soybean (D. Lee)

Resource-efficient management of summer annual dryland cereal crops in Nebraska (S. C. Mason)

Cropping systems to optimize yield, water and nutrient use efficiency of pearl millet (S. C. Mason)

The relevance of field-specific weed populations to performance of integrated weed management systems (D. A. Mortensen, J. A. Dieleman, A. R. Martin)

Why weed patches persist: dynamics of edges and density (D. A. Mortensen, J. A. Dieleman)

Herbage and livestock production from legume/grass pastures (B. E. Anderson)

Molecular characterization and manipulation of the wheat genome for crop improvement (K. S. Gill)

Effective use of carbon and nutrients in manure using site-specific application (B. Eghball, J. S. Schepers, C. A. Shapiro, R. B. Ferguson)

Euphology of corn - velvetleaf competition (J. L. Lindquist)

Management systems for improved decision making and profitability of dairy heifers (R. J. Grant, H. D. Jose)

Biophysical models for poultry production systems (M. M. Beck)

Utilization of byproducts in grain diets fed to feedlot cattle (T. Milton, T. J. Klopfenstein, T. L. Mader)

Sustainable beef growing-finishing systems (T. J. Klopfenstein, T. Milton)

Relationship of subfunctional corpora lutea to frequency of LH pulses during the periovulatory period of cattle (J. E. Kinder)

Forage protein characterization and utilization for cattle (T. J. Klopfenstein, L. E. Moser)

Genetic variation for reproduction and energy utilization (M. K. Nielsen)

Optimizing the utilization of dietary fiber and lipids by dairy cows (R. J. Grant)

Nutrition of prolific sows (A. J. Lewis, P. S. Miller)

Copper and zinc in beef cow reproduction (D. R. Brink, R. J. Rushby)

Molecular mechanisms regulating skeletal muscle growth and differentiation (S. J. Jones)

Processed and manufactured meat technology (R. W. Mandigo)

Protein and energy constraints of rapid lean growth (P. S. Miller, A. J. Lewis)

Regulation of gonadotropin synthesis and secretion and ovarian follicle development pre- and postpuberty (J. E. Kinder, R. J. Kittok)

Molecular biology of protein degradation and utilization by *Prevotella ruminicolae*: a molecular genetics approach (M. Morrison)

Testicular modulation of lutinizing hormone secretion (R. J. Kittok, J. E. Kinder, H. E. Grotjan)

Gastrointestinal structure and function as related to nutrition and body metabolism (E. T. Clemens)

Estrogen-calcium relationships during onset of metabolic bone disease in laying hens (M. M. Beck)

Molecular biology of protein degradation and utilization by *Prevotella ruminicolae* (M. Morrison)

Molecular biology of protein degradation and utilization by *Prevotella ruminicolae* (M. Morrison)

Physiological and management aspects of expression of estrus and ovulation rate in swine (D. R. Zimmerman)

Measurement and manipulation of carcass traits and influencing fresh meat value (C. R. Calkins)

Transfer of antibiotic resistance genes between bacteriofides and *Prevotella* species (M. Morrison)

Positional and functional identification of economically important genes in the pig (D. Pomp)

Physiological and nutritional aspects of improving reproduction in dairy cattle (L. L. Larson)

Screening the pig genome for QTL controlling reproduction (D. Pomp, R. K. Johnson)

Development of flow-sorted chromosome specific pools for mapping disease and production genes in pigs (D. Pomp, S. Jones, K. Arumuganathan)

Molecular and kinetic analyses of the adherence of *Ruminococcus albus* B to cellulose (M. Morrison, R. Grant)

Integration of quantitative and molecular technologies for genetic improvement of pigs (R. K. Johnson, D. Pomp)

Recombinant bovine and equine gonadotropins (H. E. Grotjan)

Synthesis and assembly of cellulose binding proteins by *Ruminococcus albus* (M. Morrison)

Recombinant bovine gonadotropins (H. E. Grotjan, J. E. Kinder)

Molecular biology of protein degradation and utilization by *Prevotella ruminicolae* (M. Morrison)
Biochemistry

15-022  rr  Regulation of photosynthetic processes (R. Chollet)
15-040  rr  Regulation of photosynthetic processes (D.P. Weeks, P.L. Herman)
15-059  ha  Structure and chemistry of compounds involved in the interactions between wheat and Hessian fly (H. W. Knoche)
15-062  ha  Mammalian cobalamin-dependent enzymes (R.V. Banerjee)
15-063  ha  Enzymology of anaerobic CO fixation and bioremediation (S.W. Ragsdale)
15-067  ha  Regulation of photosynthetic processes (R. Spreitzer)
15-069  ha  Chloroplast thylakoid protein phosphatase (J.P. Markwell)
15-070  st  Development of dicamba-tolerant plants (D.P. Weeks, P.L. Herman)
15-071  eg  Genetic modification of chloroplast rubisco (R.J. Spreitzer)
15-072  eg  Enzymes influencing leghemoglobin in legumes (R.V. Khuas, G. Sarath)
15-073  rr  Diversity and interaction of beneficial bacterial and fungi in the rhizosphere (R.V. Khuas)
15-076  ha  Hemoglobins in higher plants (R.V. Khuas)
15-077  ha  Isotope fractionation in biological systems (M. O'Leary)
15-078  ha  Genetic modification of chloroplast rubisco (R.J. Spreitzer)
15-079  st  Methanol stimulation of plant growth and yield (J. Markwell, J. Osterman)
15-080  ha  Characterization of human telomerase (C.M. Price)
15-081  ha  Syntholome proteins from soybean root nodules (G. Sarath)
15-082  eg  Rubisco phylogenetic correction (R.J. Spreitzer)
15-083  eg  The role of a family of nuclear-encoded sigma factors in plastid transcription regulation (L.A. Allison)
15-084  st  Relax control of biological activity (S.W. Ragsdale)
15-085  ha  Regulation of transcription in plastids of higher plants (L.A. Allison)

Biological Systems Engineering

11-001  st  Evaluation of performance of new tractors (L.L. Levitien)
11-044  rr  Improvement of thermal processes for food (M.A. Hanna)
11-079  ha  Agricultural tractor testing board: policies and procedures (L.L. Bashford, M.F. Koche, R.D. Griss)
11-087  ha  Fertilization techniques for furrow-irrigated crops using surge irrigation (D.G. Watts)
11-093  ha  Development and evaluation of sensors and control systems for seed handling and delivery (M.F. Koche)
11-094  ha  Use of the global positioning system in production agriculture (L.L. Bashford)
11-096  ha  Waste management: disposal site characterization and hazard assessment (W.E. Wold)
11-097  ha  Protein film production and evaluation (C.L. Weller)
11-098  rr  Integrated systems for improved water and nitrogen management in irrigation environments (D.L. Martin, D.G. Watts, N.L. Klocke)
11-099  eg  Improving field productivity and predicting energy requirements of soil-engaging equipment (R.D. Griss, M.F. Koche, L.L. Bashford)
11-101  eg  Program management and planning for advanced materials from renewable resources (L.D. Clements)
11-102  ha  Identification, modeling, and design of plant sensor systems for variable-rate chemical application (G.E. Meyer)
11-103  st  Managing atrazine runoff losses to improve surface water quality (T.G. O'Meara)
11-105  st  Safe and efficient use of electrical energy for irrigation, livestock, and poultry facilities (L.L. Stetson)
11-106  st  Whole-farm nutrient budgeting for livestock systems (R.K. Koelsch, M.C. Brumm, J.A. Nienaber)
11-107  ha  Bovine rumen contents as a source of industrial enzymes and chemicals (L.D. Clements)
11-108  sg  Using army ammunition plants to process agricultural materials into industrial products (L.D. Clements)
11-109  ha  Whole-farm nutrient balance for livestock production systems (R.K. Koelsch)
11-110  st  Variability in metering devices used in site-specific crop management schemes (L.L. Bashford)

Entomology

17-047  rr  Spatial dynamics of leafhopper pests and their management on alfalfa (S.D. Danielson)
17-054  ha  Biochemistry and physiology of lipids, prostaglandins and related eicosanoids in insects (D.W. Stanley)
17-056  ha  Determinants of insecticide toxicity in resistant pest and non-target aquatic insect species (R.D. Siegfried)
17-057  ha  Genetic factors associated with thedevelopment of aphid biotypes and insecticide resistance (Z.B. Mayne)
17-058  ha  Biology, ecology, and management of Diabrotica species (L.J. Meinkle)
17-059  rr  Development of sustainable IPM strategies for soybean arthropod pests (L.G. Higley)
17-060  rr  A national agricultural program to clear pest management agents for minor use (S.T. Kambe)
17-061  st  Management of fly population densities in cattle feedlots to reduce adverse impacts (G.D. Thomas, J.J. Petersen, S.R. Skoda)
17-062  ha  Arthropods associated with buffalograss and other turfgrasses in Nebraska (F.P. Baxendale)
17-063  ha  Stress-cereal crop interactions and development of resistant cultivars (S.S. Quisenberry)
17-064  ha  Host-plant resistance, insect genetics, and biological studies of cereal insects (J.E. Foster)
### Food Science and Technology

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<td>16-041</td>
<td>Molecular mechanisms regulating skeletal muscle growth and differentiation (M.G. Zeece)</td>
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<td>16-042</td>
<td>Development of new processes and technologies for the processing of poultry products (G.W. Fronek)</td>
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<td>16-051</td>
<td>Starch technology: production, characterization, and utilization (D.S. Jackson)</td>
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<td>16-052</td>
<td>Role of proteinase inhibitors in protein degradation (M.G. Zeece)</td>
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<td>16-053</td>
<td>Chemical and physical quality characteristics of horticultural crops and their products (D.A. Smith)</td>
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<td>16-054</td>
<td>Food allergies and sensitivities (S.L. Taylor, S.L. Helle)</td>
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<td>Food and nutritional value (S.L. Cuppett)</td>
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<td>16-056</td>
<td>Mold and mycotoxin hazards in foods, feeds, and the environment (L.B. Bullerman)</td>
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<td>16-057</td>
<td>The design of an enzyme reactor for the conversion of hemi cellulose to monosaccharides (M.M. Meagher)</td>
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<td>Evaluation and characterization of antimicrobial agents from plant sources (S.L. Cuppett)</td>
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<td>16-059</td>
<td>Physiological studies on Listeria monocytogenes (R.W. Hutkins, T. Conway)</td>
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<td>16-060</td>
<td>Control of pathogenic microorganisms of fresh fruits and vegetables (S.S. Summer, L.B. Bullerman, J.A. Allerbeck)</td>
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<td>Genetics and physiology of Streptococcus thermophilus and other lactic acid bacteria (R.W. Hutkins)</td>
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<td>Analytical methods for food process control and measurement of processing induced changes (R.L. Wehling)</td>
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<td>Marketing and delivery of quality cereals and oilseeds (L.B. Bullerman, D. Jackson)</td>
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<td>16-064</td>
<td>Fats of fumonisins B1 in heat processed corn products (L.B. Bullerman, M.A. Hanna)</td>
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<td>16-065</td>
<td>Role of proteolysis in myofilament/cytoskeleton structure and integrity (M.G. Zece, S.L. Taylor)</td>
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<td>16-066</td>
<td>Alliance for food protection (S.L. Taylor)</td>
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<td>16-067</td>
<td>Enhancing food safety through control of foodborne disease agents (C.L. Weiler)</td>
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<td>16-068</td>
<td>Identification of low temperature-induced genes in Listeria monocytogenes (A.K. Benson, R.W. Hutkins)</td>
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<td>16-069</td>
<td>Enhancement of capillary electrophoresis (M.G. Zece, D. Hage)</td>
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<td>16-070</td>
<td>Coupling of molecular recognition and signal generation in arrayed fluorescent hybridization assays (A.K. Benson)</td>
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<td>16-071</td>
<td>Detecting internal insect infestation in wheat by near-infrared spectroscopy (R.L. Wehling)</td>
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### Plant Pathology

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<td>Pathogenetic determinants of phytopathogenic fungi (M.B. Dickman)</td>
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<td>Host-parasite interactions between fungal pathogens and their hosts (J.E. Partridge)</td>
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<td>Epidemiology of diseases of edible bean crops and other vegetables in Nebraska (J.R. Steadman)</td>
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<td>21-014</td>
<td>PCR-based approaches for identification and epidemiology of parasitic nematodes (T.O. Powers)</td>
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<td>21-015</td>
<td>Genetic basis for pathogenicity in the genus Colletotrichum (M.B. Dickman)</td>
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<td>21-016</td>
<td>Detection of seedborne bacteria and characterization of bacterial endophytes (A.K. Vidaver)</td>
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<td>21-017</td>
<td>Genetic variability in the cyst and root-knot nematodes (T.O. Powers)</td>
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<td>21-018</td>
<td>Application of micropropagation and biotechnology to improvement and multiplication of horticultural crops (P.E. Head)</td>
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<td>21-019</td>
<td>Factors affecting prairie sod and grass establishment: interference in sustainable landscape management (G.L. Davis)</td>
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### Horticulture

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<td>Genetic improvement of beans (Phaseolus vulgaris L.) and nutritional value for yield, pest resistance and nutritional value (D.P. Coyne, J.R. Steadman)</td>
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<tr>
<td>20-041</td>
<td>Cultural practices to minimize environmental stress on vegetable crop production and physiology (R. Hodges, J.R. Brandle)</td>
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<td>Breeding and development of buffalograsses for low resource environments (G.L. Horst)</td>
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<td>Breeding and development of buffalograsses and other low maintenance species for Central Great Plains (T.P. Riordan)</td>
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<td>Establishment and management of turf-type buffalograsses (R.E. Gaussoin)</td>
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<td>20-045</td>
<td>Genetics and breeding of dry edible beans (Phaseolus vulgaris L.) with emphasis on multiple disease resistance (D.F. Coyne)</td>
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<td>20-046</td>
<td>Integrated turfgrass management practices (R.C. Shepard)</td>
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<td>20-047</td>
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<td>Factors affecting prairie sod and grass establishment: interference in sustainable landscape management (G.L. Davis)</td>
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### Microbiology

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<tr>
<td>17-065</td>
<td>Selection for resistance to Bacillus thuringiensis in the European corn borer (B. Siegfried, J. Witkowski, A. Zera, K. Nickerson, L. Marshman)</td>
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<td>17-066</td>
<td>Molecular interactions in aphid/wheat systems (S. Quisenberry, X. Ni)</td>
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<td>17-067</td>
<td>The influence of shelterbelts and alfalfa on natural enemies of the bean leaf beetle, Ceratoma trifurcata (Forster) in soybeans (S.D. Danielson)</td>
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<td>17-068</td>
<td>Mechanisms and management of arthropod injury to plants (L.G. Higley)</td>
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<td>17-069</td>
<td>Diagnostic techniques for monitoring Br resistance in the European corn borer (B.D. Siegfried)</td>
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<td>17-070</td>
<td>Bio-intensive pest management of the greenbug (ZB May)</td>
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<td>17-071</td>
<td>Development of resistance management techniques for corn insect pests in Nebraska (B.D. Siegfried)</td>
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<td>17-072</td>
<td>Ecology and management of Diabroticita species (L.J. Meinke)</td>
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12-209  ha  Procedures for assessing impacts of nonpoint agriehemicals on ground water (R.F. Spalding)

12-230  ha  Transport, reactions and fate of organic contaminants in soil (S.D. Comfort)

12-239  ha  Processes associated with long-term fate and detoxification of organosulfur contaminants in soil (P.I. Shea)

*21-063  ha  Biological control of soilborne diseases of legumes and turfgrass with antagonistic bacteria (G.Y. Yuen)

21-064  ha  Fusarium mycotoxins in cereal grains (M.B. Dickman)

21-065  sa  Biological control of Sclerotinia sclerotiorum on legumes in the North Central Region (G.Y. Yuen, J.L. Parke)


21-067  st  Molecular analysis of programmed cell death in plants (M.B. Dickman)

21-068  eg  Molecular mechanism of fumonisin induced pathogenesis in chicken (M.B. Dickman)

21-069  ha  Leaf rust virulence in Nebraska and management systems for turfgrass diseases (J.E. Watkins)

21-070  ha  Mitigation of diseases of dry edible bean stem rot of soybean by managed plant resistance (J.R. Strodtman)

Veterinary and Biomedical Sciences

14-009  st  Prevention and control of enteric diseases of swine (R.A. Moxley)

14-014  rr  Bovine respiratory disease (S. Srikumaran)

14-039  st  Research laboratory and animal care facility (J.A. Schmitz, G. Hogg, T.E. Schuh)

14-059  st  Veterinary diagnostic lab system: diagnostic surveillance and disease investigation in Nebraska livestock and poultry (J.A. Schmitz, A.R. Doster, J.L. Johnson, D.M. Grootechen)

14-066  ha  Functional analysis of the BHV-1 latency related gene (C. Jones)

14-077  ah  Molecular genetics analysis of Mycobacterium paratuberculosis and related mycobacterial pathogens (R.G. Barletta)

14-078  ah  Role of group A bovine rotavirus P protein antigenic epitopes in immunity and infection (G.E. Duhamel)

14-081  eg  Analysis of the bovine herpes virus 1 latency related gene (C. Jones)

14-082  eg  Cellular molecules mediating bovine viral diarrhea virus infection (R.O. Donis)


14-085  rr  Research in support of a national eradication program for pseudorabies (F.A. Osorio)

14-086  eg  Molecular characterization of Pasteurella haemolytica leukotoxin receptor interaction (S. Srikumaran)

14-087  eg  Identification of Mycobacterium paratuberculosis virulence determinants (R.G. Barletta)

14-088  eg  Analysis of BHV-1 gene expression during reactivation from latency (C.J. Jones)

14-089  eg  Role of group A bovine P protein in induction of heterotypic immunity (G.E. Duhamel)

14-090  st  Development of a mycobacterial marker vaccine (R. Barletta, R. Moxley)

14-091  eg  Molecular characterization of MHC class I down-regulation by bovine herpesvirus 1 (S. Srikumaran)

14-092  eg  The biology of persistent infections caused by porcine reproductive and respiratory virus (F.A. Osorio, A.R. Doster)

14-093  ah  Bovine respiratory syncytial virus glycoprotein interactions in a homologous host cell receptor (C. Kelling)

14-094  ah  Molecular characterization of animal RNA viruses and their interactions with the host (R.O. Donis)
Interaction of porcine reproductive and respiratory syndrome virus and Salmonella chrlzerottii (R. W. Wills, F. A. Osorio)

Functional analysis of the BHV-1 latency related gene (C. Jones)

Functional analysis of bovine herpes virus I latency related gene products (C. Jones)

Monitoring individual animal performance to evaluate beef cattle production and economics (G. P. Rupp, D. B. Griffin)

Co-acting elements in the replication of the bovine viral diarrhea virus genome (R. O. Denis)

The infant as a group participant (S. Baugher)

Family as a group participant (S. Baugher)

Surviving and transcending a traumatic childhood (J. DeFruin)

Mental illness and families: a rural perspective (C. W. Smith)

High hopes and bright futures: successful teens in Nebraska (D. A. Abbott, W. H. Meredith)

The impact of welfare reform on women’s lives: education, job placement/retention, and resource management (K. Prochaska-Cue, B. Sparks)

Economic impact of HIV/AIDS on Nebraskans (M. E. Rider)

The new relational perspective in developmental psychology and its applications to education and child care (C. P. Edwards)

Nutritional Science and Dietetics

Consumption and nutrient content and retention of vegetables and their health implications (J. A. Allrecht)

The use of natural antioxidants to control warmed-over flavor in meats (M. Schnepl)

Nutrient intake, eating behaviors, and anthropometric measurements of young children in Nebraska (K. Stanek)

Meat cookery and quality concepts for the foodservice industry (F. Hamont)

Bioavailability of nutrients: a key to human nutrition (J. A. Driskell)

Health maintenance aspects of dietary recommendations designed to modify lipid metabolism (N. M. Lewis)

Dietary trans fatty acid influence on atherosclerosis and sterol metabolism (T. P. Carr)

Using stages of change model to promote consumption of grains, vegetables and fruits by young adults (N. M. Betts)

Exercise dependence and disordered eating behaviors: instrument development validation and testing (N. M. Betts)

The metabolic basis of atherosclerosis (T. P. Carr)

The use of edible films and natural antioxidants to control warmed-over flavor in meats (M. Schnepl)

Nutritional knowledge, practices, beliefs of caregivers and practices of physicians for young children (K. L. Stanek)

Textiles, Clothing and Design

Assessment of the environmental compatibility of textile and other polymeric materials (P. Cox-Crewe)

Situational and personal factors in residential waste management: the impacts of markets, resources, and attitudes (S. M. Niemeyer)

Family business: interaction of work and family spheres (H. B. Kean)

Development of textile-end-uses for wheat gluten and other farm commodity derived materials (L. E. Hamilton)

Development of textile materials for environmental compatibility and human health and safety (P. C. Crewe)

Panhandle Research and Extension Center

Fertilizer and manure application for production of continuous corn (D. D. Bahrenberg)

Weed control systems for western Nebraska irrigated crops and rangeland (R. C. Wilson)

Feed resources and beef production systems in western Nebraska to optimize total efficiency (L. G. Rush, B. A. Weichenthal)

Agricultural enhancement of potato production and utilization (A. D. Pavlista)

Development of integrated pest management systems for major insect pests in the Nebraska Panhandle (G. L. Hein)

Sugar beet planters—planting spacing and emergence performance (M. Smith, C. D. Yonts, S. D. Kaehman)

Resource efficient dryland cropping systems for western Nebraska (D. J. Lyon)
44-016  Nutrient management of irrigated and dryland crops in western Nebraska (J.M. Blumenthal)

*44-017  Wheat curl mottle population dynamics and epidemiology of wheat streak mosaic (G.L. Hein, R.C. French, D.J. Lyon, J.E. Watkins)

44-048  Control of rhizomania and nematode diseases in sugar beets (E.D. Kerr)

*44-049  New seedbed preparation technology for improved sugar beet emergence (J.A. Smith, R.G. Wilson)

44-050  Improvement of proso millet and other crops for western Nebraska (D.D. Baltensperger)

44-051  Agronomic control in irrigation runoff water from surface irrigated fields (C.D. Yonts, R.G. Wilson)

44-052  The economics of alternative beef cattle marketing and feeding strategies (D.M. Feuz)

44-053  Machinery systems management for sugarbeets, dry edible beans, and chicory (J.A. Smith, R.G. Wilson)

44-054  Plant germplasm and information management and utilization (D.D. Baltensperger)

44-055  Intensification of winter wheat based dryland cropping systems for western Nebraska (D.J. Lyon)

Roman L. Hruska U.S. Meat Animal Research Center

46-001  Development and operation of the U.S. Meat Animal Research Center (D. Laster)

South Central Research and Extension Center

48-019  Managing weeds and herbicides for profitable crop production and reduced environmental risks (F.W. Roeth)

48-020  Nitrogen management factors influencing utilization efficiency and loss processes to the environment (R.B. Ferguson)

*48-021  Factors influencing spatial yield and use efficiency of furrow-irrigated corn (R.B. Ferguson, G.W. Hergert)

48-022  Crop insect pest management in Nebraska: biological control and sampling (R.J. Wright)

48-023  Formulation of nitrogen fertilization recommendations to maximize economic and environmental goals (R.A. Selley)

*48-024  Epidemiology and life history of Ctenstigma africana in the Great Plains (J.P. Stack)

48-025  Subsurface drip irrigation: Integrated water and nitrogen BMPs for corn and assessing irrigation uniformity in situ (B.L. Benham)

West Central Research and Extension Center

43-042  Sorghum and corn breeding and corn, sorghum, and wheat variety evaluation under central Nebraska environmental conditions (P.T. Nordquist)

43-047  Selection and development of native herbaceous landscape plants (B.T. Lindgren)

*43-050  Beef nutrition and production systems for Sandhills rangeland (D.C. Adams)

*43-052  Quantifying year-around leaching losses in structured soil with percolation lysimeters (N.L. Klocke)

*43-054  Evaluation of management practices to improve reproductive efficiency of beef heifers (G.H. Deutscher, D.C. Adams)

43-055  Weed control management in reduced tillage systems (G.A. Wicks)

43-056  Interaction of trace minerals as related to prenatal supplementation of the pregnant beef cow (J.L. Johnson)

43-057  Improving the profitability and sustainability of Sandhills beef cattle operations (R.T. Clark)

43-058  Biology, ecology, economics and control of major insects affecting cattle in Nebraska (J.B. Campbell)

43-059  Production systems and nutrition for Sandhills and Northern Great Plains range (D.C. Adams)

43-060  Management of arthropod pests of livestock and poultry (J.B. Campbell, G.D. Thomas)

43-061  Management practices to improve reproduction of beef heifers (G.H. Deutscher)

43-062  Genotype by environment interactions for sow productivity and early piglet growth (T.E. Long)

43-063  Grazing management strategies and systems for Sandhills meadows (J.D. Volesky)

Interdisciplinary Activities

Administration

01-001  General administration of federal fund research (D.W. Nelson)

01-004  Regional research coordination, North Central Region (D.W. Nelson)

Agricultural Research and Development Center

45-001  Field laboratory development (D. Duncan)

Center for Grassland Studies

33-001  Center for grassland studies (M.A. Massengale)

Center for Sustainable Agricultural Systems

31-002  Center for sustainable agricultural systems (C.A. Francis)

31-003  Biological and economic consequences of flexible crop rotations (C.A. Francis)

31-004  Integrated crop/livestock research for sustainable systems (C.A. Francis, T.J. Klopenstein, J. Brandle)

Food Processing Center

19-003  Development and evaluation of food products, processes and markets (S.L. Taylor)

19-004  Midwest food manufacturing alliance (S.L. Taylor)

*19-005  Development and quality/safety enhancement of specialty food products (S.L. Taylor)

19-007  Development and quality/safety enhancement of specialty food products (S.L. Taylor)

Industrial Agricultural Products Center

29-007  Industrial agricultural products center (M.A. Hanna)

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While serving the needs of Nebraska's agricultural producers, agribusinesses, industries, communities and citizens, the ARD places a high priority on being accountable for its resources and documenting impacts of its programs. As in all research institutions, ARD scientists are charged to actively disseminate results of research in scientific journals and technical publications. The division sets optimistic, but reachable, annual goals for scientific publication, theses and dissertations, and other measures of research output. In each of the last three years the goals have been exceeded.

Publications in refereed (peer reviewed) scientific journals represent professional acknowledgment of the value of a research finding to the discipline. ARD scientists have published in a number of different scientific journals during 1997. Faculty also have written books, edited books or contributed chapters for books.

Another major contribution of the ARD research faculty is the education of graduate students pursuing a Master of Science (M.S.) or Doctor of Philosophy (Ph.D.) degree. One responsibility of a graduate degree is the completion of a thesis (M.S.) or a dissertation (Ph.D.)

Publications in refereed journals, books, book chapters, refereed proceedings, theses and dissertations are listed for calendar year 1997.

Journals in which faculty have published in 1997

Agricultural Economics

Agribusiness Journal
American Journal of Alternative Agriculture
Choices
Journal of Agricultural and Resource Economics
Journal of Cooperatives
Journal of Industrial Economics
Journal of Economic Entomology

Agronomy

Agronomy Journal
American Journal of Alternative Agriculture
Applied Engineering in Agriculture
Bulletin of Environmental Contamination Toxicology
Bulletin of the American Penstemon Society
Canadian Journal of Microbiology
Cereal Chemistry
Crop Science
Environmental Engineering Science
Environmental Pollution

Foods and Biotechnology
Genome
HortScience
International Turfgrass Society Research Journal
Journal of the American Water Resources Association
Journal of Dairy Science
Journal of Environmental Quality
Journal of Environmental Radioactivity
Journal of Experimental Botany
Journal of Geophysical Research
Journal of Plant Nutrition
Journal of Production Agriculture
Journal of Range Management
Journal of Soil and Water Conservation
Journal of Sustainable Agriculture
Maydica
Natural Areas Journal
Plant Cell, Tissue and Organ Culture
Plant Molecular Biology Reporter
Plant Physiology
Science of the Total Environment
Society and Natural Resources
Soil Biology and Biochemistry
Soil Science
Terra
Transactions of the American Society of Agricultural Engineers
Weed Science
Weed Technology
Animal Science

Applied and Environmental Microbiology
Brazilian Journal of Genetics
FEMS Microbiology Letters
Food and Chemical Toxicology
Genetical Research
Journal of Dairy Science
Journal of Animal Science
Journal of Applied Poultry Research
Journal of Muscle Foods
Journal of Range Management
Journal of Soil and Water Conservation
Journal of Thermal Biology
Livestock Production Science
Mammalian Genome
Poultry Science
Theriogenology
Tissue and Cell
Transactions of the American Society of Agricultural Engineers

Biochemistry

Applied and Environmental Microbiology
Archives of Biochemistry and Biophysics
Australian Journal of Plant Physiology
Biochemistry
Bioelectromagnetics
Brazilian Journal of Plant Physiology
British Journal of Medicine
Chemistry and Biology
FEBS Letters
Journal of the American Chemical Society
Journal of Biological Chemistry
Journal of Molecular Biology
Methods of Enzymology
Molecular Biology of the Cell
Plant Physiology

Biological Systems Engineering

Applied Engineering in Agriculture
Cereal Chemistry
Ground Water
Industrial Crops and Products
Journal of Agriculture and Food Chemistry
Journal of Animal Science
Journal of Contaminant Hydrology
Journal of Environmental Quality

Journal of Food Engineering
Journal of Food Science
Journal of Soil and Water Conservation
Journal of Thermal Biology
Lebens, Wiss. U. Technology
Plant Foods for Human Nutrition
Starke
Transactions of the American Society of Agricultural Engineers

Biometry

Cereal Chemistry
Foods and Biotechnology
HortScience
Journal of Agricultural, Biological and Environmental Statistics
Journal of American Society for Horticulture Science
Journal of Food Quality
Journal of Food Science
Journal of Production Agriculture
Journal of Range Management
Journal of Soil Science Society America
Journal of Soil and Water Conservation
Journal of Thermal Biology
Poultry Science
Transactions of the American Society of Agricultural Engineers
Weed Technology

Entomology

Agronomy Journal
American Zoology
Annals Entomological Society of America
Apidologie
Archives of Insect Biochemistry and Physiology
Bulletin of Environmental Contamination and Toxicology
Comparative Biochemistry and Physiology
Environmental Entomology
Environmental Toxicology and Chemistry
Insect Biochemistry and Molecular Biology
International Turfgrass Society Research Journal
Journal of Economic Entomology
Journal of Environmental Sciences
Journal of Forestry
Journal of Insect Physiology
Journal of Kansas Entomology
Journal of Production Agriculture
Journal of Sustainable Agriculture
Pesticide Biochemistry and Physiology
Food Science and Technology

Applied and Environmental Microbiology
Biotechnology Bioengineering
Cereal Chemistry
Enzyme Microbiology Technology
Food and Chemical Toxicology
Foods and Biotechnology
Journal of Applied Poultry Research
Journal of AOAC International
Journal of Agricultural Food Chemists
Journal of Chromatography
Journal of Capillary Electrophoresis
Journal of Food Protection
Journal of Food Quality
Journal of Membrane Science
Maydica
Starke
Tissue and Cell

Horticulture

Journal of American Society for Horticultural Science
Journal of Food Quality
Journal of Sustainable Agriculture
HortScience
International Turfgrass Society Research Journal
Science of the Total Environment

Plant Pathology

Applied Environmental Microbiology
Gene
Journal of the American Society for Horticultural Science
Journal of Nematology
Journal of Virology
Molecular Plant-Microbe Interactions
Molecular Breeding
Physiological Molecular Plant Pathology
Plant Disease
Plant Molecular Biology
Science
Virology

School of Natural Resource Sciences

Agricultural Ecosystems & Environment
BioScience
Bulletin of Environmental Contamination and Toxicology
Canadian Journal of Microbiology
Crop Science
Environmental Engineering Science
Environmental Pollution
Environmental Toxicology and Chemistry
Hydrobiologia
Journal of the American Water Resources Association
Journal of Environmental Quality
Journal of Environmental Radioactivity
Journal of Freshwater Ecology
Journal of Geophysical Research
Journal of Hydrology
Journal of Production Agriculture
Journal of Soil and Water Conservation
Journal of Sustainable Agriculture
Journal of Wildlife Management
North American Journal of Fisheries Management
Plant Physiology
Plant Systematics and Evolution
Remote Sensing of Environment
Rivers
Science of the Total Environment
Soil Science
Transactions of the American Society of Agricultural Engineers
Wildlife Society Bulletin

Veterinary and Biomedical Sciences

Clinical and Diagnostic Laboratory Immunology
Clinical Infectious Diseases
FEMS Microbiology Letters
International Journal for Vitamin and Nutrition Research
Journal of American Veterinary Medical Association
Journal of Bacteriology
Journal of General Virology
Journal of Veterinary Diagnostic Investigation
Journal of Virology
Microbiology
Swine Health and Production
Vaccine
Veterinary Microbiology
Viral Immunology
Virus Research
Human Resources and Family Sciences Departments

Family and Consumer Sciences

Early Child Development and Care
Journal of Family and Consumer Sciences
Great Plains Research
Journal of Family Psychology
Rural Sociology

Nutritional Science and Dietetics

International Journal of Vitamin and Nutrition Research
Journal of Animal Science
Journal of Food Quality
Journal of Nutrition Education

Textiles, Clothing and Design

Clothing and Textiles Research Journal
Journal of Family and Consumer Sciences
Journal of Small Business and Entrepreneurship
Journal of Small Business Management
Psychology & Marketing

Off-Campus Research Centers

Northeast Research and Extension Center

Journal of Kansas Entomology
Journal of Animal Science
Journal of Soil and Water Conservation
Swine Health and Production

Panhandle Research and Extension Center

Crop Science
Journal of Economic Entomology
Journal of Production Agriculture
Journal of Range Management
Journal of Sugar Beet Research
Journal of Veterinary Diagnostic Investigation
Plant Disease
Soil Science
Weed Technology

South Central Research and Extension Center

Bulletin of Environmental Contamination and Toxicology
Environmental Entomology
Journal of Agricultural and Resource Economics
Journal of Production Agriculture
Journal of Sustainable Agriculture
Seed Technology
Transactions of the American Society of Agricultural Engineers

West Central Research and Extension Center

Journal of Animal Science
Journal of Economic Entomology
Journal of Production Agriculture
Journal of Range Management
Journal of Veterinary Diagnostic Investigation
Weed Science
Weed Technology
**Research Publications (1997)**

**Agricultural/Natural Resources Units**

**Agricultural Economics**

**Journal Articles**


**Book Chapters**


**M.S. Thesis**


**Ph.D. Dissertations**


Perry, P. J. 1997. The value of additional central flyway wetlands in Nebraska’s rainwater basin-three essays. (R. K. Perrin, Advisor)


**Agricultural Leadership, Education and Communication**

**Journal Article**


**M.S. Thesis**


**Agronomy**

**Journal Articles**


Book Chapters


Referred Proceedings


M.S. Theses


Callan, A. P. 1998. Grazing date by stocking rate effects on prairie sandreed. (P.S. Baernighizer, Advisor)


Ph. D. Dissertations


Espitia-Rempel, E. 1997. The IACR translocation in the hard red winter wheat. (P.S. Baernighizer, Advisor)


M.S. Theses


Ph.D. Dissertation

Ph.D. Dissertation

Biological Systems Engineering

Journal Articles


Hanson, D.E. 1997. Design and introduction of an appropriate surface water handpump. (L.D. Clements, Advisor)


Ph.D. Dissertations


Biometry

Journal Articles


Book Chapters


Entomology

Journal Articles


Book Chapters


M.S. Theses


Akkuju, E. 1997. Impacts of wooded riparian edges and cultural practices on arthropod abundance in agricultural systems. (M.E. Dix and J.E. Foster, Advisors)


Heng, T. M. 1997. An investigation on the beneficial arthropods associated with buffalograss and the influence of Rhupus nigricornustrich (Ashmead) on buffalograss mealybug populations. (J. P. Haxenbile and T. P. Riordan, Advisors)


Ph.D. Dissertations


Gouveia-Marcon, P. 1997. Baseline susceptibility to Bacillus thuringiensis and genetic studies of the European corn borer Ostrinia nubilalis (Hübner) (Lepidoptera: Pyralidae). (B. D. Siegfried, Advisor)

Food Science and Technology

Journal Articles


M.S. Theses


**M.S. Theses**


**Ph.D. Dissertations**


Pence, M.D. 1997. Rapid molecular markers for the genes controlling seedling lethality and plant crippling in common beans. (D.P. Coyne, Advisor)

Szendrlik, E. 1997. Asymmetric in vitro seed germination, micropropagation and scanning electron microscopy of several temperate terrestrial orchids (*Oncidacea*). (P.E. Read, Advisor)

**Plant Pathology**

**Journal Articles**


**Book Chapter**


**M.S. Thesis**


**Ph.D. Dissertations**


**School of Natural Resource Sciences**

**Journal Articles**


Research Bulletin

Veterinary and Biomedical Sciences

Journal Articles

(J. Series No. 11434)

A retrospective study of the effect of porcine reproductive and respiratory syndrome virus (PRRSV) on
(J. Series No. 11990)

Risk factors associated with endemic reproductive deficiencies caused by PRRSv infection. Swine Health and
(J. Series No. 11891)

Overexpression of the D-alanine racemase gene confers D-cycloserine resistance in the Mycobacterium
(J. Series No. 11637)

Hepatitis and increased copper levels in a Dalmatian. Journal of Veterinary Diagnostic Investigation 9:201-203.
(J. Series No. 11351)

Renal lesions associated with porcine reproductive and respiratory syndrome virus (PRRSV) infection. Journal of Veterinary Diagnostic Investigation 9:198-201.
(J. Series No. 11357)

The effect of a multivalent Clostridium botulinum vaccination on sudden death syndrome rates at a Nebraska
feedlot. Journal of the American Veterinary Medical Association 211:749-753.
(J. Series No. 11590)

Characterization of a novel transcriptional promoter in the latency related gene of bovine herpes virus 1 which is active during
(J. Series No. 11036)

Colonic spirochetal infections in nonhuman primates that were associated with Brachyspira aalborgi, Serpulina pilonidalis, and unclassified
flagellated bacteria. Clinical Infectious Diseases 23:186-188.
(J. Series No. 11685)

Multiplex polymerase chain reaction for simultaneous detection of
Luescinia intracellularis, Serpulina hylodesenterica and Salmonella in
(J. Series No. 11537)

Immuno blot reactivity of polyclonal and monoclonal antibodies with
periplasmic flagellar FlaA and FlaB of porcine Serpulina species. Clinical and Diagnostic Laboratory Immunology 4:400-404.
(J. Series No. 11754)

Restriction fragment length polymorphism of the periplasmic
(J. Series No. 11850)

A quantitative study of the efficacy of a deletion mutant BHV-1
differential vaccine in preventing the establishment of latency. Vaccine 15:123-128.
(J. Series No. 11388)

Seroconversion and reproductive deficiencies caused
by porcine reproductive and respiratory syndrome virus replicates in testicular germ cells, alters spermatogenesis, and induces germ
(J. Series No. 11933)

Analysis of cyclins and cyclin dependent kinases after an infection
(J. Series No. 11532)

Effect of passively acquired pseudorabies virus-specific antibody on establishment of latency and seroconversion to differential
glycoprotein A under low dose challenge of young pigs. Veterinary Microbiology 55:91-98.
(J. Series No. 11260)

Outer membrane-associated serine protease of intestinal spirochetes.
FEMS Microbiology Letters 154:159-164.
(J. Series No. 11910)

Laboratory identification and enteropathogenicity testing of
Serpulina pilonidalis associated with porcine colonic spirochotosis.
(J. Series No. 11469)

Detection of canine parvovirus (CPV) in naturally infected dogs with
(J. Series No. 11569)

ß-carotene and ß-carotene inhibit the development of atherosclerotic lesions in hypercholesterolemic
(J. Series No. 11349)

Porcine reproductive and respiratory syndrome virus replicates in testicular germ cells, alters spermatogenesis, and induces germ
(J. Series No. 11933)
Book Chapters


M.S. Theses

Bryan, L.K. 1997. Lung lesions in feedlot aged beef calves at slaughter: an observational study to develop methodologies for recording lung lesions at slaughter and investigating their associations with production. (D. Griffin, Advisor)

Gottipati, S. 1997. Host cellular protein(s) interacting with the glycoprotein of bovine herpesvirus-1. (S. Srikumaran, Advisor)


Topfiff, C. 1997. Analysis of the 5' untranslated region of bovine viral diarrhea virus genotype 2 isolates varying in virulence. (C.L. Kelling, Advisor)


Ph.D. Dissertations


Human Resources and Family Sciences Departments

Family and Consumer Sciences

Journal Articles


M.S. Theses


Battleton, D. 1997. Forgiveness as a factor in marriage and in conflict resolution following an extramarital affair. (C.R. Smith, Advisor)


Wanggaard, S. 1997. The voice of the consumer: A qualitative study of a program to reduce adolescent risk behaviors using focus groups and interviews. (W.H. Meredith, Advisor)

Nutritional Science and Dietetics

Journal Articles


Book


Book Chapters


M.S. Theses

Textiles, Clothing and Design

Journal Articles


Referred Proceedings


Ph.D. Dissertations


Off-Campus Research Centers

Northeast Research and Extension Center

Journal Articles


M.S. Thesis


Panhandle Research and Extension Center

Journal Articles


West Central Research
and Extension Center

Journal Articles


Research Bulletin


Book Chapters


M.S. Theses

Downs, D. 1997. Diet composition of Sandhills winter range and compensatory growth of yearling steers during summer grazing. (T.J. Klopfenstein and D.C. Adams, Advisors)

Olson, P.A. 1996. Effects of supplementing trace minerals after calving on productivity of 2-year-old cows. (G.H. Deutscher, Advisor)

Ph.D. Dissertation

Lardy, G.P. 1997. Protein supplementation of calves and cows grazing sandhills range and subirrigated meadows. (D.C. Adams and T.J. Klopfenstein, Advisors)

Refereed Proceedings


A RD receives funding from federal formula funds, industry grants, federal grants and state appropriations. During fiscal year 1997-1998, faculty with ARD appointments obtained grant and contract funds that totaled $21,836,373. This amount represents 45.3 percent of all research grant and contract funds received by UNL. The extramural funds coming to ARD faculty to address problems of importance to Nebraska have a significant direct impact on the state’s economy.

Report of Research Expenditures
The University of Nebraska
Agricultural Research Division
July 1, 1997 through June 30, 1998

Federal Formula Funds:

- Hatch Formula ..................... $2,155,406
- Regional Research ................. $ 913,083
- McIntire-Stennis ................. $ 93,168
- Animal Health ...................... $ 145,817
- Total Federal Formula Funds ........ $ 3,307,474

State Appropriated Funds .................. $26,275,045

Contracts and Grants:

- USDA Cooperative Agreements ..... $1,996,410
- USDA Special and Competitive Grants $2,487,336
- Federal Grants - (NSF, NIH, USEPA, AID, DOE) ..... $4,432,623
- Industry Grants ...................... $6,431,460
- Total Grants and Contracts .......... $15,347,460

Product Sales ........................ $ 7,603,055

Total Expenditures ...................... $52,533,403

1Includes $1,369,910 of Nebraska Research Initiative funds expended by ARD affiliated units.
2$294,103 was included to show actual Agricultural Research Division expenditures reflecting transfers from International Programs.
# Agricultural Research Division

## Research Investments by Category and Funding Source FY 1998

<table>
<thead>
<tr>
<th>Expenditure Category</th>
<th>State Appropriated &amp; Hatch Funds</th>
<th>Federal Grants</th>
<th>Industry Grants</th>
<th>State &amp; Revolving Funds</th>
<th>All Funds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salaries, Wages and Benefits</td>
<td>38.5</td>
<td>5.2</td>
<td>3.6</td>
<td>0.8</td>
<td>25.8</td>
</tr>
<tr>
<td>Faculty/Administrative</td>
<td>12.7</td>
<td>9.6</td>
<td>5.2</td>
<td>3.9</td>
<td>10.9</td>
</tr>
<tr>
<td>Managerial/Prof</td>
<td>12.1</td>
<td>9.6</td>
<td>12.3</td>
<td>16.1</td>
<td>11.6</td>
</tr>
<tr>
<td>Office/Service</td>
<td>12.1</td>
<td>9.6</td>
<td>6.1</td>
<td>10.9</td>
<td>11.0</td>
</tr>
<tr>
<td>Hourly Wages</td>
<td>6.2</td>
<td>13.1</td>
<td>21.0</td>
<td>.8</td>
<td>9.9</td>
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<tr>
<td>GRA Stipends</td>
<td>13.0</td>
<td>7.9</td>
<td>7.7</td>
<td>5.4</td>
<td>11.0</td>
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<tr>
<td>Benefits</td>
<td>83.1</td>
<td>51.5</td>
<td>56.0</td>
<td>31.1</td>
<td>71.9</td>
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<tr>
<td>Subtotal:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating</td>
<td>10.4</td>
<td>40.6</td>
<td>27.3</td>
<td>58.2</td>
<td>19.8</td>
</tr>
<tr>
<td>Supplies and Expenses</td>
<td>0.8</td>
<td>3.3</td>
<td>5.8</td>
<td>2.6</td>
<td>2.1</td>
</tr>
<tr>
<td>Travel</td>
<td>5.7</td>
<td>4.6</td>
<td>11.0</td>
<td>8.1</td>
<td>6.1</td>
</tr>
<tr>
<td>Subtotal:</td>
<td>16.9</td>
<td>48.5</td>
<td>44.0</td>
<td>68.9</td>
<td>28.1</td>
</tr>
<tr>
<td>Total:</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>
# Agricultural Research Division
## Selected Research Program Information

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Information:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Projects at beginning of year</td>
<td>366</td>
<td>384</td>
<td>387</td>
</tr>
<tr>
<td>Projects terminating</td>
<td>39</td>
<td>44</td>
<td>57</td>
</tr>
<tr>
<td>Projects revised</td>
<td>26</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>New projects</td>
<td>57</td>
<td>47</td>
<td>38</td>
</tr>
<tr>
<td>Projects at the end of the year</td>
<td>384</td>
<td>387</td>
<td>368</td>
</tr>
<tr>
<td><strong>Faculty full-time equivalents (FTE)</strong></td>
<td>128.4</td>
<td>126.3</td>
<td>130.8</td>
</tr>
<tr>
<td><strong>Expenditures for budgeted research faculty:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal formula and state approp./FTE(^1)</td>
<td>$230,157</td>
<td>$242,581</td>
<td>$239,650</td>
</tr>
<tr>
<td>Grant and contracts/FTE</td>
<td>$119,739</td>
<td>$126,158</td>
<td>$116,030</td>
</tr>
<tr>
<td>Product sales/FTE</td>
<td>$47,236</td>
<td>$51,824</td>
<td>$58,127</td>
</tr>
<tr>
<td><strong>Outputs from research programs(^2):</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Refereed journal articles</td>
<td>312</td>
<td>280</td>
<td>289</td>
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<tr>
<td>Research bulletins</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Books and book chapters</td>
<td>49</td>
<td>54</td>
<td>49</td>
</tr>
<tr>
<td>M.S. and Ph.D. theses</td>
<td>132</td>
<td>139</td>
<td>136</td>
</tr>
<tr>
<td>Cultivars and germplasm released</td>
<td>19</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Patents obtained</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

\(^1\)Includes cost of administration and expenditures from the Nebraska Research Initiative by ARD-affiliated faculty.

\(^2\)A large number of abstracts, technical reports, and other non-refereed articles also are published by faculty each year.
The scientist is a lover of truth for the very love of truth itself, wherever it may lead.

Luther Burbank
U.S. naturalist and plant breeder