



October 2005



Red River Valley Agricultural Research Center

RESEARCH NEWS FROM THE VALLEY

Caring for the future



Red River Valley
Agricultural Research Center
Fargo, ND & East Grand Forks, MN

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From the Director

As you have come to expect, in this issue of the "Research News From The Valley," we highlight activities from the Red River Valley Agricultural Research Center's six research units. We also share recent examples of the worldwide recognition that Center staff continue to receive. As this is my first chance to visit with you since my arrival here in Fargo on 11 July, I would also like to catch you up on a few things that you might be wondering about.

You will be pleased to learn that Larry Chandler is doing very well, following his move to the ARS Northern Plains Area Office in Ft. Collins, CO. I regularly communicate with Larry and he has been enormously helpful in assisting me with the transition to the Center. Larry frequently mentions how he misses the folks at the Center and NDSU, as well as those of you who have worked so closely with him on improving and expanding programs here in Fargo and East Grand Forks. In addition to providing the Center continuing support and encouragement from Ft. Collins, Larry will be participating in our December 15, 2005, Research Partners Meeting here in Fargo, and the Sclerotinia Initiative Conference 18-20 January 2006 in Bloomington, MN. We are very fortunate to have Larry so close and so dedicated to the RRVARC.

I would also like to acknowledge the leadership of Brady Vick who served as Interim Center Director from November 29, 2004, until my arrival in July of 2005. As you might expect, leadership transitions at a Center as large as RRVARC are frequently complicated and difficult. However, Brady demonstrated great ability in managing day-to-day administrative challenges normally encountered at a Center of the complexity of the RRVARC, and continued to foster strong ties between our research units and our customers, stakeholders, and numerous friends and colleagues. Brady was, of course, admirably assisted in this process by an excellent Research Leader Team and dedicated Center Administrative Staff, all of whom I have come

to rely on during the past several months.

I want to thank all of you who by word and action have made my spouse Cheryl and I feel so welcome here in the valley. The months since our arrival have passed very quickly and all that I have encountered, from NDSU administrators and scientists, to representatives from the remarkable breath of commodity groups that we serve, to Center staff have been encouraging and patient with my many questions. To say that I have a lot to learn would be like saying that Larry Chandler has left some rather large boots to fill. Please be assured that I feel very fortunate to be here in Fargo and that I am absolutely impressed with the connections and cooperation at all levels between agricultural commodity groups, NDSU, and the Center. You have my pledge to work hard and effectively at maintaining the collective momentum that has been nurtured here.

On a personal note, I would like to address perhaps the most frequent question posed to me since our Fargo arrival in July, that being "Do you know about the winters?" Well, although Cheryl and I have not experienced a "true" ND winter, we were both raised in New England, she in northern ME (known for nine months of winter and three months of poor sledding each year) and myself in western MA, we raised our two children MT, and we delight in a variety of winter activities. I am, however, shopping for a new winter coat.

In closing, if you have any questions about anything that you see in this research update, please don't hesitate to contact Center staff directly. They work very hard to be sure that we produce relevant research of the highest quality. Thank you for your interest and support of our diversified programs here at the Center. I look forward to working with you!

Bill Kemp

Center Director

PASS IT ON!!!!

Feel free to pass on this issue of *Research News from the Valley* to others interested in agricultural research in the Northern Plains Area. To be added to our mailing list contact Alicia Thompson by phone (701-239-1370), fax (701-239-1395), or e-mail (thompsona@fargo.ars.usda.gov).

Sunflower Researchers Collect “New” Species in Colorado and Wyoming

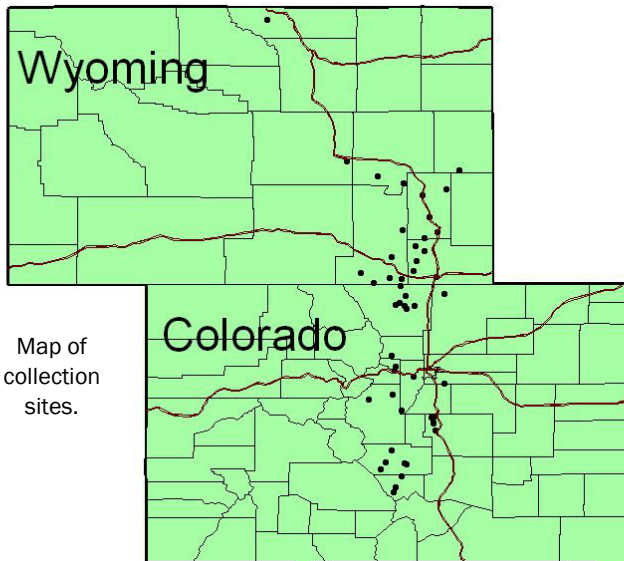
A three-person team, consisting of Drs. Tom Gulya (Research Plant Pathologist) and Gerald Seiler (Research Botanist) of the USDA-ARS Sunflower Unit, and Dr. Laura Marek (Sunflower Curator) of the USDA-NCR Plant Introduction Station (Ames, IA), recently made a trip to Colorado and Wyoming to collect seeds of *Helianthus pumilus*, the ‘foothills sunflower.’ This perennial sunflower is only found in those two states, and the wild *Helianthus* germplasm collection in Ames previously only had one accession that was available for distribution to researchers. Drs. Gulya, Seiler and Marek spent 11 days covering 3200 miles in both states, and succeeded in finding and collecting seeds from 46

populations. Their travels took them from southern CO in the Colorado Springs area to the Wyoming-Montana border, and from 4000 to almost 9000’. Seeds from this collection trip will provide both U.S. and foreign researchers the first opportunity to investigate the potential value of this species to improve cultivated sunflower. The trip was reviewed and funded by the USDA Office of Plant Exploration.

For more information, contact Dr. Brady A. Vick, Research Leader, Sunflower Research Unit, at vickb@fargo.ars.usda.gov



L-R: Drs. Tom Gulya, Laura Marek and Gerald Seiler, at about 12,000 nearly to the treeline in southern Colorado.



Helianthus pumilus closeup.



Helianthus pumilus and *Liatris* (blazing star) another plant commonly found together.



Helianthus pumilus and prickly pear cactus, frequently found together.



Chimney Rock, on the Colorado/Wyoming border, with *Helianthus pumilus* growing in roadside ditch.

Cereal Crops Scientist Receives OECD Fellowship

Dr. Tim Friesen, Research Plant Pathologist, has been awarded a fellowship by the Organization for Economic Development to travel to the Australian Centre for Necrotrophic Fungal Pathogens at Murdoch University in December. Dr. Friesen is collaborating with Dr. Richard Oliver on

the purification and characterization of a host selective toxin associated with *Stagonospora nodorum* blotch disease of wheat. The fellowship was awarded through the OECD Co-operative Research Programme: Biological Resource Management for Sustainable Agricultural Systems. The

objective of this program is to promote international cooperation and networking among research scientists and institutions in priority areas of basic and applied agro-food research. OECD began its mission in 1961 as an economic counterpart to NATO and is headquartered in Paris.



Dr. Tim Friesen
Research Plant Pathologist

Dr. Prem Jauhar Presents Wheat Genetics Lectures in Bangladesh and India



Dr. Prem Jauhar, Research Geneticist in the Cereal Crops Research Unit, was invited this past January to present a series of lectures in Bangladesh and India, speaking to various groups about alien gene transfer in wheat using tools of classical cytogenetics and modern biotechnology.

While visiting Bangladesh to evaluate a research project, Dr. Jauhar gave a

seminar at Dhaka University. Later, in Calcutta, he gave a keynote presentation at the National Symposium on Classical Cytogenetics and Modern Biotechnology, sponsored by the Centre for Advanced Study in Cell and Chromosome Research at the University of Calcutta. In appreciation, Dr. Jauhar was awarded a plaque by the Vice Chancellor of the university.

In New Delhi, Dr. Jauhar gave the Panchanan Maheshwari Memorial Lecture at the centennial celebration of the prominent embryologist's birth. The lecture was a formal event, preceded by a ceremonial procession of academics. He also presented lectures at the Indian Institute of Technology, Kanpur; the University of Agricultural Sciences, Bangalore; the International Centre for Genetic Engineering

and Biotechnology (ICGEB), New Delhi; and the Swaminathan Research Foundation, Chennai (Madras).

Dr. Jauhar's research focus is on wheat germplasm enhancement using classical and molecular cytogenetics. In 1995, Dr. Jauhar's laboratory produced the world's first transgenic durum wheat, and developed a standard procedure for genetic transformation of durum.

Dr. Jauhar also serves as Associate Editor for the Journal of Heredity, and is a Fellow of the Crop Science Society of America, a Fellow of the American Society of Agronomy, and a Fellow of the American Association for the Advancement of Science.

Justin Faris Wins 2005 Early Career Scientist of the Year Award

Dr. Justin Faris, Research Geneticist in the Cereal Crops Research Unit, has been honored as the Northern Plains Area Early Career Research Scientist of the Year "for outstanding contributions to the advancement of our understanding of the wheat genome through cutting-edge research in wheat genomics and molecular genetics."

Each year, ARS recognizes the creative efforts, scientific leadership, and the major research accomplishments of ARS research scientists

through this awards program. Contributions of these scientists help position ARS in the forefront of agricultural research. Sixteen scientists are selected and rewarded annually for this nationwide program. Each Area selects a senior research scientist and an early career research scientist. By receiving the Area award, Dr. Faris became a candidate for the Agency's Herbert L. Rothbart Outstanding Early Career Research Scientist award. Winners will be formally recognized at the ARS Annual Rec-

ognition Program to be held February 7, 2006, in Washington, D.C.

Dr. Faris joined the Cereal Crops Research Unit in May 2000. Earlier this year, his efforts were recognized here at the RRVARC with our own 2005 Outstanding Scientist Award (given to one scientist at the Center every 2 years).

Congratulations again, Justin!

For more information, contact Dr. Michael C. Edwards, Research Leader, Cereal Crops Research Unit, at edwardsm@fargo.ars.usda.gov



Dr. Justin Faris
Research Geneticist

Leafy Spurge - A Modern Day Model Weed



Dr. James Anderson, Research Chemist, is examining dormant crown buds of leafy spurge. Dr. Anderson leads the research unit to develop the EST database and microarrays for this noxious perennial weed.

Improved knowledge about the biology of weeds is critical to stimulate progress in weed management. The biological characteristics that make leafy spurge such a nuisance in rangelands, makes this plant a model weed to advance our understanding of weedy traits like dormancy and vegetative reproduction. In the November/December 2005 issue of the journal *Weed Science*, Research Scientists in Plant Science Research will published a paper in entitled "Potential model weeds to study genomics, ecology, and physiology in the 21st century." In the article, compelling arguments are made for promoting leafy spurge as a model plant for the study of perennial broadleaf weed species (Canada thistle,

field bindweed, etc.) based on its known weedy characteristics, ease of propagation, existing tools, stakeholder support, and an existing scientific community with interest and expertise. The greatest potential for enhancing our understanding of bud dormancy and vegetative reproduction, and hence discovering new management strategies, is dependent on our unique genomics-based research program for studying global patterns of gene expression in the model noxious weed, leafy spurge.

Important components of genomics-based programs are Expressed Sequence Tag (EST)-databases which can be used to identify unique gene sequences for the construction of DNA microarrays. Microarray technologies are now standard procedures in modern biotechnology laboratories which allow scientists to study the global expression of hundreds to thousands of genes in one experiment. Through various in-house, collaborative, and competitively funded programs, we now have in excess of 55,000 ESTs in our leafy spurge database. These ESTs represent in excess of 23,000 unique gene sequences which are currently in the process of being organized for the construction of DNA microarrays. We already have plans to use the leafy spurge microarrays to identify the signaling pathways involved in regulating dormancy in crown and root buds. Understanding how these signaling pathways regulate dormancy will enhance our understanding of potential treatments to manipulate dormancy and vegetative reproduction.

*For more information, contact
Dr. Michael E. Foley, Research Leader
(foleym@fargo.ars.usda.gov) or
Dr. James V. Anderson, Research Chemist
(andersjv@fargo.ars.usda.gov),
Plant Science Research Unit*

Environmental Management System

As directed in Executive Order #13148, the Center approved a new Environmental Management System (EMS) in June. An EMS is a framework that allows an organization to consistently address the effects its operations may have on the environment. It includes the use of cost effective practices to minimize environ-

mental impacts, the use of more environmentally preferred materials, reduction of waste, recycling, and energy conservation. An EMS Committee has been formed and EMS Awareness Training was provided to all staff.

*For more information, contact
Dr. William P. Kemp, Center Director,
USDA-ARS-RRVARC, Fargo, ND.
kempw@fargo.ars.usda.gov*



ARS Collaborates in Release of New Oat Cultivars



Field of Mature Oats.

Many people now understand that oats are a nutritious and healthful food. They are high in protein and contain high levels of soluble fiber, known as beta-glucan, that has a physiological effect on humans of lowering blood cholesterol. Thus, the consumption of oats or oat products can lower the chance of heart disease. Oats are also an important animal feed, and are particularly important in regions where corn and soybeans cannot be grown, or where horses are raised exten-

sively. Oats are also processed to make value-added products. To remain competitive with imported oats, the quality of oats grown in the United States needs improvement to enhance their milling and nutritional value for food, feed, and value-added applications.

Doug Doehlert leads an oat research project that evaluates factors affecting oat quality, generates new and improved means to evaluate oat quality, and interacts closely with the North Dakota State University oat breeding program to generate improved cultivars.

The cultivar 'HiFi' is one of the fruits of this collaboration. This cultivar has quite high soluble fiber – about 50% more soluble fiber than oats currently on the market. An organic food company is currently negotiating an agreement with NDSU to market this high fiber oat as a health food. Doehlert has provided technical advice on the evaluation and processing of oats, as well as some analytical services re-

lated to nutritional composition, to facilitate the smooth transfer of this technology to the marketplace.

This company contracts with a number of small organic farms to produce HiFi oats, and oat flakes generated from this production will be marketed for their improved health-benefiting properties.

The NDSU oat breeding program, in collaboration with Doehlert, has recently released two other new oat cultivars, named Maida and Stark. Maida is a high quality milling oat with improved stem rust resistance. Stark is a high yielding, high quality naked oat. These new oat cultivars are designed to bring current germplasm improvements to the oat producers of the northern plains region.

McMullen, M.S., Doehlert, D.C., and Miller, J.D. (2005) Registration of HiFi oat. *Crop Science*, 45:1664.

For more information, contact Dr. Michael C. Edwards, Research Leader, Cereal Crops Research Unit, at edwardsm@fargo.ars.usda.gov

ARS Former Soviet Union Scientific Cooperation Program Project with Tajikistan

The main objective of this project is the synthesis of agricultural or environmental chemicals. Initially this will involve the determination of the synthetic route(s) required to introduce or build a radiolabel nuclide into these chemicals. Once the radiolabeled chemical has been synthesized, studies can be conducted in our laboratory to determine how they are absorbed, transported, changed (metabolized), or eliminated in the animals, manure management systems, or soils. The results from these studies will also help develop new, more effective isolation techniques and analyses for these foreign compounds to insure a safe food supply.

Through collaboration with scientists from Tajikistan and Russia we plan to have them synthesize the radiolabeled agricultural and environmental chemicals we will use in our food-safety residue work.



For more information, contact Dr. Gerald L. Larsen, Research Leader, Animal Metabolism & Ag. Chemical Research Unit, at larseng@fargo.ars.usda.gov

Reducing Postharvest Sugar Loss in Sugarbeet

The U.S. sugarbeet crop accounts for more than 54% of total domestically produced sugar with a market value in excess of \$1.2 billion. In the MN/ND production area centered in the Red River Valley, annual beet production exceeds 14 million tons. Depending on the production area, the harvested sugarbeet crop is stored for up to 250 days prior to processing. It has been estimated that sugarbeet roots lose between 100-300 grams of sucrose per ton per day. When multiplied by a total production of roughly 30 million tons, postharvest loss of sugar can exceed thousands of tons per day of storage.

Cellular respiration is the principal cause of sugar loss in stored beets. Respiration is affected by a number of factors including genetics, environment, wounding or damage, and disease. Research in the Sugarbeet & Potato Research Unit is

directed toward identification of the internal physiological and biochemical processes that affect sugarbeet root respiration and the development of novel approaches to reduce root respiration and postharvest sugar loss.

Sugarbeet roots can be severely damaged during harvest, handling, and piling. The tissue wounding resulting from this damage has a dramatic three-fold effect on root respiration. First, wounding directly induces a 2-3-fold increase in respiration that persists for at least 4 days (Figure 1). Second, wounding stimulates the production of the plant hormone ethylene (Figure 2) which in turn can stimulate respiration in neighboring unwounded roots (Figure 3). Lastly, the process of respiration produces heat, raising the temperature of the storage pile, which further stimulates respiration in both dam-

aged and healthy roots.

Ethylene may play a pivotal role in increased respiration in piles containing severely damaged roots. In addition to stimulating respiration in unwounded roots, ethylene may directly stimulate respiration in the wounded tissue as well. Current research will more fully define the role of ethylene in postharvest root respiration and will determine the effects of ethylene antagonists on respiration rates in damaged sugarbeet roots.

For more information, contact Dr. Jeffrey C. Suttle, Research Leader, Sugarbeet & Potato Research Unit, at suttlej@fargo.ars.usda.gov

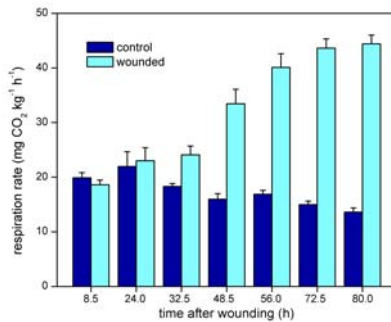


Figure 1

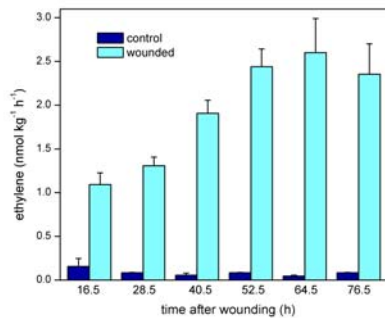


Figure 2

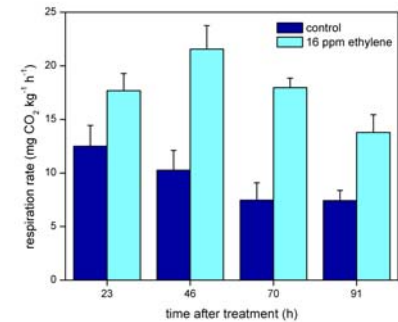


Figure 3



Sugarbeet Piling Operation

Sclerotinia Initiative FY2005 Progress Report

White mold (*Sclerotinia*) caused by *Sclerotinia sclerotiorum* is an economically devastating disease of numerous broad leaf crops throughout the United States. Research to manage this disease is being actively addressed under the umbrella of the Sclerotinia Initiative, which was first funded in FY2002. A steering committee representing ARS and five national commodity organizations (canola, dry bean, pea & lentil, soybean, and sunflower) developed overall program guidelines and met to determine priority research needs. Thirty-nine specific cooperative agreements have been established to date with 13 land-grant universities and the National Sunflower Association of Canada, and 6 ARS research locations across the U.S. were identified to conduct research to meet program objectives. Numerous releases of sclerotinia resistant germplasm have occurred and substantial progress in genetic sequencing of the disease have occurred within the last 12 months. Highlights from some of the projects are listed below:

At present, no acceptable commercial snap bean cultivar resistant to white mold is available. To address this need a snap bean breeding line with some resistance to white mold, Cornell 501, was developed and released by a cooperating scientist at Cornell University. A multi-site test system was established and coordinated by the University of Nebraska and verified putative white mold resistance in the line.

Two isolates of *Sclerotinia sclerotiorum* (ND21 and ND30) were successfully transformed with the green fluorescent protein gene (GFP) using two different constructs (pCT74 and gGFP) and protoplast-PEG technology by scientists at North Dakota State University. The transformed isolates were shown to be pathogenic on dry bean, canola, soybean and sunflower. These isolates expressed GFP in vitro and in the tissue of the four crops. The fluorescing hyphae were readily distinguished from plant tissue allowing the process of infection and tissue colonization to be observed.

Scientists at Michigan State University constructed the pBKSbar/gf-2.8 transformation plasmid to contain the wheat germin, gf-2.8, which encodes oxalate oxidase and the reporter gene, bar which confers tolerance to herbicide glufosinate ammonium. Two transformation approaches were carried out to transform the dry bean cultivars Matterhorn and Olathe. The potential of dry beans engineered to express the wheat germin may provide an opportunity to control the oxalic acid generated by the white mold pathogen upon infection.

2006 USDA-ARS Sclerotinia Initiative Annual Meeting

The USDA-ARS National Sclerotinia (white mold) Initiative annual meeting will be held in Bloomington, MN, on January 18-20, 2006. Participants will provide research updates, discuss customer and stakeholder needs, and outline new research directions and long range plans to address integrated disease management development. All interested individuals are welcome to attend.

For more information, please visit:
<http://www.whitemoldresearch.com/>

A PROGRAM OF THE



Sclerotinia Initiative FY2006 Pre-Plan of Work

This is the 5th year of the Sclerotinia Research Initiative. The Initiative is leading a process to continue development of a comprehensive *Sclerotinia sclerotiorum* research plan with related budgetary considerations that is passed on to the USDA-ARS as a recommendation. The Steering Committee of the Initiative seeks pre-plans of work for FY2006 to address important research areas related to managing this disease.

Please visit <http://www.whitemoldresearch.com/> for additional information. Potential principal investigators (PIs) should **carefully** read the instructions and ensure that their pre-plans of work conform **exactly** to the described format.

For more information, please contact Dr. Laurence D. Chandler, USDA-ARS in Ft. Collins, CO at 970/492-7058. A single hard copy and one electronic copy (submitted either via email at thompsona@fargo.ars.usda.gov or on a CD) of each pre-plan of work must be received at the following address by COB December 12, 2005:

Dr. William P. Kemp/Alicia Thompson,
 USDA-ARS-RRVARC, Northern Crop Science Laboratory,
 1307 18th Street North, Fargo, ND 58105-5677
 701/239-1370

Dioxins in Food of Animal Origin

On June 16, 2005, Dr. Janice Huwe was the featured speaker at a symposium on “Dioxins in Food of Animal Origin” organized and sponsored by the National Veterinary Research & Quarantine Service (NVRQS) of South Korea. During the one-day symposium, Dr. Huwe presented seminars on her studies into the pharmacokinetics of dioxins and dioxin-like compounds in livestock and the results of recent surveys of these persistent pollutants in U.S. meat and poultry. Five Korean scientists participated in the symposium and gave seminars on topics such as improved dioxin analysis, monitoring levels of dioxins in Korean food, and risk assessment. The symposium was attended by approximately 50 scientists, professors, and government representatives from South Korea. During her week-long visit, Dr. Huwe also gave seminars to smaller groups of scientists at the NVRQS and the Korean Food & Drug Administration (KFDA) highlighting the research conducted by the Animal Metabolism-Agricultural Chemicals Research Unit into persistent pollutants. She was able to visit with Dr. Dongmi Choi (KFDA) and Ms. Sooyeon Kim (NVRQS) who had both spent time in her laboratory learning the essentials of dioxin analysis in foods.

For more information, contact Dr. Gerald L. Larsen, Research Leader, Animal Metabolism & Ag. Chemical Research Unit, at larseng@fargo.ars.usda.gov



Symposium participants.



Dr. Sooyeon Kim and Dr. Janice Huwe



Dr. Janice Huwe and Dr. Dongmi Choi

Advance May Help Mobilize More Wasps Against Grape Pest



Dr. Wenlong Chen
Department of Entomology
North Dakota State University

Gonatocerus wasps don't bug people. But these tiny parasites can put a real hurt on glassy-winged sharpshooters, leaf-hopping insects that pose a disease threat to California grape vineyards.

Now, an experimental method of refrigerating parasitized sharpshooter eggs for up to

60 days may improve the artificial rearing of *Gonatocerus* wasps for field release as biological control agents. Agricultural Research Service (ARS) entomologist Roger Leopold is investigating the egg-storage method along with Marion Harris and Wenlong Chen, both with North Dakota State University in Fargo.

Gonatocerus wasp releases are part of a multi-pronged approach California has taken to keep sharpshooters from spreading the bacterium *Xylella fastidiosa*, which causes Pierce's disease in grapevines and other host plants. *Gonatocerus* wasps reproduce by laying their eggs inside those of sharpshooters. After hatching, *Gonatocerus* larvae eat their egg hosts, emerging 10 to 12 days later as adult wasps. In California, *Gonatocerus*' spring emergence lags

behind sharpshooters, so fewer are around to parasitize the pest's eggs. (Fall attacks, though, can inflict sharpshooter losses of up to 90 percent.)

Releasing insectary-reared wasps can help close that gap, but the practice is expensive and time-consuming since live plants and sharpshooter eggs must be used. Refrigerated storage could cut production costs and furnish more time to amass the wasps for spring releases, notes Leopold, with ARS' Biosciences Research Laboratory, Fargo.

In studies there with *G. asmeadi* and *G. triguttatus* wasps, Leopold's team stored parasitized sharpshooter eggs for 30 to 60 days by adjusting three temperature settings in a stair-step fashion. Under one such regimen, starting and

ending with 4.5 and 7.5 degrees Celsius, respectively, the wasp emergence rate was 60 percent. Importantly, their health and longevity was similar to control groups, reports Leopold.

His team plans on submitting a scientific paper describing the results, including wasp-emergence rates from dead eggs. Leopold and Chen will also present their work at the Pierce's Disease Research Symposium in San Diego, December 2005.

For more information, contact Dr. James S. Buckner, Research Leader, Insect Genetics & Biochemistry Research Unit, at bucknerj@fargo.ars.usda.gov



USDA-ARS-RRV ARC Fargo, ND

1307 North 18th Street
P.O. Box 5677, State University Station
Fargo, ND 58105-5677

Phone: 701-239-1370
Fax: 701-239-1395
Email: thompsona@fargo.ars.usda.gov

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WE'RE ON THE WEB!

[HTTP://WWW.ARS.USDA.GOV/NPA/RRVARC](http://www.ars.usda.gov/npa/rrvarc)

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RED RIVER VALLEY AGRICULTURAL RESEARCH CENTER *Vision Statement*

An internationally recognized center of excellence for integrated agricultural research on high priority problems to ensure a safe and abundant food supply.

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Upcoming Events:

EVENTS AT THE CENTER

NOVEMBER 2005

3: Dr. John Finley, A.M. Todd, Inc. Wilderness Art, & Nutritional Biochemistry: Observations & Analogies from 16 yrs. of Selenium Research." USDA-ARS-BRL Large Conf., Rm., 9 a.m.

7: Dr. Hans Jorgensen, Dept. of Plant Biology, The Royal Veterinary & Agricultural University Denmark. "Defense Responses in Wheat Against *Septoria tritici*," USDA-ARS-NCSL Large Conf. Rm., Fargo, ND, at 11 a.m.

11: Veteran's Day (Center Closed)

24: Thanksgiving (Center Closed)

28: ND State Seed Commission Mtg., NCSL Large Conf. Rm., 9 a.m. - 4 p.m.

DECEMBER 2005

5: Dr. Richard Amasino, University of Wisconsin. "Vernalization: An Environmentally Induced Epigenetic Switch in

Arabidopsis." USDA-ARS-BRL Large Conf. Rm., 3 p.m.

14: Dr. Tracey Slotta, USDA-ARS-BRL. BRL Large Conf. Rm., 10 a.m.

15: 2005 Research Partners Meeting, NCSL-LCR

25-26: Christmas (Center Closed)

JANUARY 2006

1-2: New Years (Center Closed)

30-Feb. 2: Cereal Crops Expert Review - NCSL-LCR

EVENTS ELSEWHERE

NOVEMBER 2005

6-10: 2005 ASA-CSSA-SSSA International Annual Mtg., Salt Lake City, UT

21: Sugarbeet Research & Education Board of MN & ND, Fargo, ND

DECEMBER 2005

5-7: 2005 Pierce's Disease Research Symposium, San Diego, CA

15-18: Entomological Society of America, Ft. Lauderdale, FL

JANUARY 2006

10: Sugarbeet R&E Board of MN & ND: Reporting Session, Fargo, ND

10-12: North Dakota Weed Control Assn. Mtg., Dickinson, ND

11-12: National Sunflower Assn. 2006 Research Forum, Fargo, ND

14-18: Plant & Animal Genome XIV Mtg., San Diego, CA

18-20: NDSU/USDA-ARS 4th Annual Sclerotinia Initiative Mtg., Bloomington, MN

FEBRUARY 2006

9: RRVARC Seminar, USDA-ARS-NCSL-LCR, 10 a.m.

13-17: Weed Science Society of American, New York, NY

15-16: Potato Industry Leadership Program, Grand Forks, ND

15-16: International Crop Expo, Grand Forks, ND

MARCH 2006

8: RRVARC Seminar, USDA-ARS-NCSL-LCR, 10 a.m.

8-9: USDA-ARS Workshop: Preservation of Insect Genetic Resources, Ft. Collins, CO

22-24: Flax Institute of the United States, Fargo, ND

MAY 2006

24-27: 2nd International Conference on Nonmammalian Eicosanoids, Bioactive Lipids & Plant Oxylipins, Berlin, Germany

JULY 2006

15-21: 17th International Symposium on Plant Lipids, Michigan State University, E. Lansing, MI