

PathogeNews

Department of Plant Pathology Annual Newsletter 2019



1920 **N** 2020

DEPARTMENT OF PLANT PATHOLOGY

*100 Years of Discovery,
Innovation, and Outreach*

UNIVERSITY of NEBRASKA-LINCOLN

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In the Department of Plant Pathology, we are **MAKING AN IMPACT** on a **GLOBAL LEVEL** by working to **SOLVE CHALLENGES** associated with microbial interactions affecting **SUSTAINABLE** plant productivity while training the **NEXT GENERATION** of basic and applied scientists.



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TABLE OF CONTENTS

Greetings	2
Graduate Student Assoc.	4
Faculty Team Highlights	5
Student Awards	14
Fresh Faces	15
Retirements	17
In Remembrance	18



STUDENTS, PAGE 4



LABS, PAGE 5

**RETIREMENTS
PAGE 17**

Front cover photo: Farmers in Nebraska grow over 5 million acres of soybeans each year and soil-borne diseases significantly impact production throughout the state. Pictured is Fusarium root rot of soybean caused by *Fusarium solani*.
Credit: Dr. Loren Giesler

**AWARDS
PAGE 14**

**F
R
E
S
H**



**F
A
C
E
S**

PAGE 15

PathogeNews is an annual publication from UNL's Department of Plant Pathology.
Editor & Designer: Madilyn McKay
Editor: Amber Hadenfeldt

All Team Highlights were written by each respective faculty member. All photos are from faculty and staff within the department, or from the UNL digital photo archive.

Letter

FROM THE HEAD OF THE DEPARTMENT DR. LOREN GIESLER



Greetings from the Department of Plant Pathology at the University of Nebraska-Lincoln. Our department is excited to provide an update on our activities in the recent past and present. In September of 2018, Dr. Jim Steadman stepped down as head after serving for eleven years. I assumed the role resulting from a national search and in 2019, completed my first year as head of the department. This has been a humbling transition for me from my original student years beginning in 1992 and spending 20 years as an extension specialist at UNL. I feel very fortunate to be a part of the legacy of Plant Pathology at UNL and look forward to all that our department will do in the coming years. Those of you that know me, know that I am very passionate about our department and strive for us to build on our legacy as leaders in the field of plant pathology.

Our faculty, staff, and students all have amazing achievements across our discipline from basic to applied sciences within our field. Below are a few points to highlight from 2019.

- Dr. Sydney Everhart was granted tenure and promoted to associate professor in July
- Our department produced 11 graduate degrees: 7 M.S. and 4 Ph.D.
- Major loss: Dr. Jim Alfano passed away as a result of a long term battle with cancer
- Our students were recognized with 33 local and national awards
- Dr. Jim Steadman retired after almost 50 years of service to UNL
- Jae Brungardt received the first Lambrecht Award – technologist award resulting from an endowment in memory of Patricia Lambrecht (technician for Anne Vidaver)
- Margaret Denning retired after 15 years of departmental service as administrative associate
- Faculty secured \$2 million in funding to support their programs
- In the fall of 2018, our department submitted a proposal to have our own graduate program. This was fully approved in January 2020, and we will be welcoming students into the program in August!

Our department is celebrating our Centennial year in 2020. Wow – an amazing century of the presence of Plant Pathology at the University of Nebraska-Lincoln! The department started in 1920 with faculty members George Peltier and Robert Goss – two giants in the field of plant science and microbiology. Since that time, Plant Pathology at Nebraska has had a strong history of discovery, innovation, and educational outcomes to facilitate disease management locally and around the world. My goal for our department is to build a strong future for plant pathology on the shoulders of the giants that have come before us in this amazing department. We collectively strive to explore and create innovations that will help feed our growing world's population with means that are sustainable.

Wishing you all the best in 2020!

Dr. Loren Giesler

A handwritten signature in cursive script that reads "Loren". The signature is written in black ink and is located below the typed name of Dr. Loren Giesler.



Letter

**FROM THE PLANT PATHOLOGY GRADUATE
STUDENT ASSOCIATION PRESIDENT, NATALIE HOLSTE**

The Plant Pathology Graduate Student Association (PPGSA) consists of both students enrolled in the plant pathology department and other interested students working closely with the department. We have a wide variety of students working on projects from all areas of plant pathology. Our students come from Agronomy & Horticulture, the School of Biological Sciences, and Complex Biosystems. We even allow undergraduates to participate in events to further their interest in plant pathology and network with invited speakers.



In order to connect with other departments, last February we organized the First Annual Elevator Speech Contest. Participating departments from the College of Agricultural Sciences and Natural Resources judged their students' three-minute research presentations and sent their top five students to the final round with all other departments. This gave the students practice at condensing their research and thinking about science communication. We had an awesome turnout with the top three contestants coming from the Entomology and Agronomy & Horticulture departments.

Our club has made a big impact in the department through Student-Faculty Engagement Lunches. A couple years ago, the club started a list of topics that students don't learn about on a regular basis such as finding grants, setting up an effective experiment, connecting with industry members, or transitioning from graduate school to the real world. The events also allow us to network with the department faculty and outside speakers.

Every year, the club brings in one guest speaker for our department's seminar series. On February 24, we hosted Dr. Maricelis Acevedo at UNL. Dr. Acevedo received her Ph.D. under Dr. Jim Steadman in 2007 working on common bean rust. Now, she works at Cornell on the Delivering Genetic Gain in Wheat Project.

The past couple summers we had a great outreach opportunity thanks to the help of our Plant & Pest Diagnostic Clinic Extension Educator, Kyle Broderick, at his Farmer's Market booth in the downtown Haymarket. Every other Saturday, Kyle brought diseased plants from his clinic to show. PPGSA helped educate the public and answer any questions they had about their own plants. Since many students' research primarily involves bench-work, this was a wonderful way to learn applied plant pathology. It also helped inform the public of our department and our various outreach activities.

PPGSA President,

Natalie Holste

A handwritten signature of Natalie Holste in black ink. The signature is written in a cursive, flowing style.

PPGSA IN ACTION

OFFICERS

President: Natalie Holste
Vice President: Sourav Pal
Treasurer: Abigail Borgmeier
Secretary: Gabriella Martens
GSA Representative: Rosalba Rodriguez-Peña

Social Media Coordinator: Sourav Pal
Student-Engagement Lunch Coordinator: Asha Mane
Centennial Committee Representative: Natalie Holste
APS North Central 2020 Representative: Sourav Pal



From L-to-R: Rosalba Rodriguez-Peña, Natalie Holste, Sourav Pal, and Gabi Martens at a student association fair booth, promoting the PPGSA.



Top: Edgar Nieto-Lopez at the Haymarket Farmer's Market.
Bottom: Kyle Broderick, Rosalba Rodriguez-Pena, and Anthony Muhle at the Farmer's Market booth.

IN FALL 2020, the PPGSA will head to Iowa to visit Bayer Crop Sciences and Corteva! This will be a memorable, engaging, and useful experience, especially for students considering going into industry.



2020 t-shirt design

Interested in a t-shirt, coming in to talk to graduate students over lunch, or be a featured seminar speaker? Contact President Natalie Holste at natalie.holste@huskers.unl.edu!

****Dependent upon interest, a round of t-shirt ordering will happen around June 2020. Details are forthcoming.*

FACULTY TEAM HIGHLIGHTS

Wilson Lab



Members-Left, top to bottom: Dr. Gang Li, Reegan Salverson, Michael Richter. Right, top to bottom: Ziwen Gong, Dr. Raquel Rocha, Ngoc That, Dr. Richard Wilson (advisor)

2019 was a good year for the Wilson lab. Raquel Rocha graduated and has several papers from her work in various stages of submission in high-impact journals. Raquel and Dr. Wilson also had a review published this year that is already garnering citations. They had three other publications in 2019 featuring the work of past and current lab members, including Guangchao Sun's PhD work in *MPMI* and Dr. Gang Li's postdoctoral work in *New Phytologist*, a top-tier plant sciences journal. Their research is currently focused both on understanding how the fungus *Magnaporthe oryzae* suppresses a plant's innate immunity to cause rice blast disease, and on understanding the nature and regulation of the plant-fungal interface. This year, the lab secured \$599,000 in funding from the highly competitive NSF-Plant Biotic Interactions program to continue these investigations. In 2019, they said goodbye to visiting scientist Dr. Jun Yang and welcomed two new graduate students, Michael Richter from the UNL Complex Biosystems PhD program and Ziwen Gong, a PhD student from Dr. Wende Liu's lab at the Chinese Academy of Agricultural Sciences. We also received UCARE funding for two talented undergraduates, Ngoc That and Reegan Salverson.

Dr. Wilson spent one month in China last summer supervising research at the Laboratory of Cotton Disease in the Institute of Food Science and Technology at the Chinese Academy of Agricultural Sciences in Beijing. This was a productive venture resulting in two papers (currently in the works) on *Verticillium* effectors. Dr. Wilson was an invited plenary speaker at the 8th International Rice Blast conference in Chengdu, China. and at the International Symposium on Plant Pathology and Sustainable Agriculture in Beijing, organized by Dr. Youliang Peng, president of the Chinese Phytopathological Society, and Prof. Sheng Yang He, US National Academy of Sciences Member from Michigan State University.



Powers Lab



Members (L-to-R): Tim Harris, Peter Mullin, Kris Powers, Lisa Sutton, Dr. Tom Powers (advisor), Cassidy Thomas, Becky Higgins, and Abigail Borgmeier

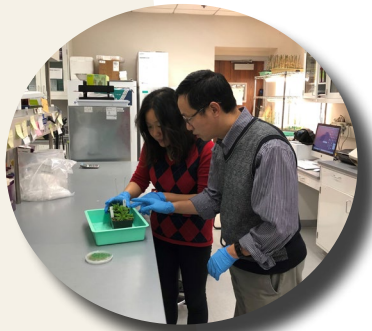
Three current lab members and a former student were among the authors in a *Nature* paper describing the global abundance and functional group composition of soil nematodes. An estimated $4.4 \pm 0.64 \times 10^{20}$ nematodes inhabit earth's surface soils. Mehmet Ozbayrak, from Turkey, completed and

published his MS thesis, a survey of lesion nematodes in the Great Plains. Abigail Borgmeier, from Minnesota, joined the Nematology Laboratory and is leading an investigation into soil biodiversity in the Lincoln Prairie Corridor. Becky Higgins completed a Field Guide to the Nematodes of the Big Thicket Preserve, and they published the first report of Alfalfa Cyst Nematode in North America.

Zeng Lab

DISTINCTIONS

Dr. Zeng was elected as Chair of the Molecular and Cellular Phytopathology Committee (MCP) with APS in 2019. On behalf of MCP and the APS Foundation, Dr. Zeng successfully organized the 18th I.E. Melhus Graduate Student Symposium during the Plant Health 2019 Conference in Cleveland, OH.



Members: Lirong Zeng (advisor), Yi Zhang (not pictured)



@LZ3_UN

Research in Dr. Zeng's lab has focused on identification and characterization of genes and signal transduction pathways involved in plant immunity against microbial pathogens using the tomato-*Pseudomonas syringae* pv tomato pathosystem. In particular, his lab is interested in the roles and molecular mechanisms by which ubiquitination, a post-translational protein modification process, regulates plant defense responses. Dr. Zeng's research in 2019 is centered on studying the role of a plasma membrane-localized ubiquitin E3 ligase, Fti1B, in plant-bacterial interactions, a project that is funded by National Science Foundation (NSF). The scientific investigation in his lab in 2019 also involves in-depth understanding of how an endoplasmic reticulum-localized ubiquitin E2 triplet functions in plant immunity. Dr. Zeng's research group disseminates findings from these projects through presentations at professional conferences, participation in public events, and teaching. Dr. Zeng was invited to give an oral presentation titled "A UBC13-Interacting, RING Type E3 Ligase Acts with BAK1 And BIK1 to Regulate Plant Immunity" at the American Phytopathological Society

(APS) Annual Conference (Plant Health 2019) at Cleveland, OH this August. His lab also participated in the 2019 UNL Fascination of Plants Day event and had high school students and their science teacher tour his research lab. In addition, this is the second year that Dr. Zeng taught a newly opened, undergraduate and graduate dual-listed course, Microbial Genetics and Genomics. With support from NSF for underrepresented groups, Dr. Zeng's lab was able to host an undergraduate student, Sarina Kao, from Villanova University for a 2019 summer research program and an international visiting scholar, Dr. Dan Wang, to conduct research in his lab. The long-term goal for Dr. Zeng lab is to elucidate and eventually manipulate the key molecular mechanisms that plants use to defend against different biotic stresses for crop improvement.

Herr Lab

The research in the Herr Lab is focused on the use of nucleotide sequencing techniques to elucidate the taxonomy and function of host-associated microorganisms. In other words, they identify "who" is on and inside a host and "what" they could be doing. While they are focused mainly on studying plant hosts, they have grant funding to study plant roots, soil crusts, and human skin. What unites these seemingly unrelated projects is the methods they use. Lab members have diverse projects, but use similar techniques to address their research questions. PhD student Ashley Stengel (co-advised by Rhae Drijber in Agronomy & Horticulture) is studying the diversity and function of bacteria and fungi associated with Maize roots under different cropping regimes and fertilizer applications. PhD student Erin Carr (co-advised with Dr. Steven Harris) is studying the interactions of microorganisms in biological soil crusts in an effort to understand how life can persist in extreme environmental conditions (think the Nebraska sandhills!). PhD student Thais Egreja is studying disease resistance mechanisms of Maize when subjected to pathogens in Nebraska such as Goss's Wilt (*Clavibacter*) and leaf streak (*Xanthomonas*). The newest member, Post-doc Rachel Koch, is interested in fungal-plant-insect interactions and she is a "Jill-of-all-trades" around the laboratory, helping with many projects. They had nine undergraduate researchers this past year who helped graduate students with their projects and also conducted their

own research projects.

In addition to the “core” lab group, they have a lot of collaborations with researchers in the UNL departments of Agronomy & Horticulture, Animal Science, Statistics, Entomology, Biochemistry, Biological Sciences, Engineering, Food Science, and Geological Sciences. They had three visiting students from other universities this summer and also hosted two visiting faculty on sabbatical.

Members: Josh Herr (advisor), Jerry Bricker (visiting scientist), Erin Carr, Thomas Casart, Thais Egreja, Rachel Koch Bach, Ashley Stengel



Some of the Herr lab group, along with members of the Drijber Lab in Agronomy & Horticulture at UNL, on the last day of root and soil collecting for their Maize root microbiome field study. The groups try to have a lot of fun while tackling questions related to host-associated microbiomes! (Pictured members L-to-R: Josh Herr, Tommy Casart, Eledon Beyene, and Ashley Stengel.)



@number_three

Wegulo Lab

Research in the Wegulo Lab focuses on the epidemiology and integrated management of Fusarium head blight (FHB), a devastating disease of wheat and other small grain cereal crops caused mainly by *Fusarium graminearum*. Recently, *Fusarium boothii* was found for the first time in the United States causing FHB in Nebraska wheat fields. Field, greenhouse, and lab research has shown that: (1) a triazole fungicide is more effective than a strobilurin fungicide in controlling FHB and reducing the associated mycotoxin deoxynivalenol (DON, vomitoxin) when applied to wheat heads at flowering, (2) the reduction in DON observed in the field from applying a triazole fungicide at flowering can be extended through the period of grain storage, (3) genetic expression of Tri5, a gene necessary for DON production, can increase during storage of high

moisture wheat grain, (4) lower concentrations of *Fusarium graminearum* spores are more efficient than the standard concentration in discriminating FHB-susceptible from moderately resistant wheat varieties or lines, (5) the window of field application of a triazole fungicide to control FHB and DON can be extended from flowering to six days later, giving growers much needed flexibility, and (6) integrating two or more strategies to manage FHB and DON in the field is more effective than using a single strategy. The Wegulo lab also screens wheat lines in the UNL small grains breeding program for resistance to FHB, stem rust, and leaf rust. Dr. Wegulo is extensively involved in extension activities including the development and delivery of clientele-targeted educational materials, crop production clinics, field days, and annual wheat disease surveys.



Members: Janelle Millhouse (retired), Carlos Bolanos-Carriel (2018), Julie Stevens, Russ Canaday, Dr. Stephen Wegulo (advisor), Haritha Nunna (not pictured), and Sourav Pal (not pictured)

Harveson Lab

Dr. Bob Harveson is an Extension Plant Pathologist at the Panhandle Research and Extension Center in Scottsbluff, NE. His current appointment involves 50% research and 50% extension, with statewide programming responsibility for specialty crop diseases. His research program focuses on the etiology and applied management of root rot diseases of sugar beets, bacterial diseases of dry beans, and sunflower diseases utilizing the integration of biological, cultural, chemical, and predictive methods. He has conducted additional projects involving several new pulse crops (chickpeas,

cowpeas, and dry yellow peas) as well as potatoes, corn, chicory, and wheat.

The plant pathology program has employed field disease surveys and disease diagnostics as cornerstones to establish an extension and research program. The diagnostic lab at Scottsbluff has processed more than 27,000 total (plant and soil) samples since the fall of 1999. This service has created new publications, generated partial income for technical support, and identified and highlighted important problems, while also providing preliminary data for new proposals that attempt to address these issues with applied research. This service has additionally resulted in more than 25 reports on the occurrence of new diseases. Some of the more unusual or obscure diseases discovered include: a root rot of sunflowers caused by the parasitic broomrape species, *Orobanche ludoviciana*; an unnamed, never before reported member of the Tombusvirus family on sunflowers; a new color variant (pink) of bacterial wilt pathogen on dry beans; sugar beet seedling rust; and dry rot canker of sugar beets caused by binucleate species of *Rhizoctonia* (anastomosis group – AG F).

Dr. Harveson, (right), enjoying a truly Nebraskan pasttime: lazily floating down a river in a cattle tank. How relaxing!



In 2019, Bob received the APS North Central Division's Distinguished Service Award. Bob was the 33rd person to be a recipient of this award. Of the 33 other recipients, 5 have been members of our Department, with Mike Boosalis being the first recipient ever in 1986.

Garcia-Ruiz Lab



Members: Rosalba Rodriguez-Pena, Benjamin Downing, Natalie Holste, Talitha Harrington, Deepti Nigam Singh, Maria Luisa Morales (former visiting graduate student), Hernan Garcia-Ruiz (advisor), Jennifer Yoo (former visiting undergraduate student), Katherine LaTourette

Deepti Nigam Singh was the recipient of an American Society of Virology Cares award in 2019 for her work in the Garcia-Ruiz lab as a post-doc.

Our lab is focused on the study of plant-virus interactions such as the mechanisms regulating antiviral gene silencing, determinants of symptom development in virus-infected plants, determinants of host adaptation, and genomic variation in viruses. Plants and other eukaryotes use gene silencing to target and destroy foreign RNA, including viruses. Our research focuses on the early steps of this RNA silencing pathway, such as initiation and amplification. We are also interested in the interaction between the host's antiviral processes and the pathogenicity of plant viruses. This balance is regulated by genes which make hosts either resistant or susceptible. We are interested in identification and characterization of cellular factors with pro-viral or antiviral activities. We emphasize an interdisciplinary approach and combine biochemical, genetic, genomic, and bioinformatic tools. We use gene editing to determine the roles of host genes in antiviral genes or susceptibility. We use experimental model systems that consist of positive- and negative-strand RNA viruses and model plants *Arabidopsis thaliana* and *Nicotiana benthamiana*. We are particularly interested in the mechanisms of Maize Lethal Necrosis. We have identified several silencing suppressors from viruses implicated in Maize Lethal Necrosis. We have also identified hypervariable regions in the potyviral genome.

These regions may allow potyviruses to adapt to a wide variety of hosts and vectors without compromising functionality. The computational approach developed is a fundamental tool for profiling viruses of agricultural importance. Our findings have an immense impact on agriculture, such as molecular diagnostics and engineering of genetic resistance to viral diseases in plants.

For more information visit:
<https://plantvirology.unl.edu/>

Everhart Lab



Members (L-to-R): Srikanth Kodati, Sergio Gabriel-Peralta, Edgar Nieto-Lopez, Karen Ferreira Da Silva (front), Becky Higgins (back), Margarita Marroquin-Guzman, Asha Mane, Julianne Matczyszyn, and Sydney Everhart. Not pictured: Nikita Gambhir, Cristian Wolkup-Gil, Olivia Renelt, Rachel Persson, and Gulcin Ercan

“Dynamic” is the singular word that captures both the spirit of our lab group and aptly represents our research. The topics that we investigate are increasingly diverse and include studies on the ecology and evolution of nematode and fungal pathogens, etiology and epidemiology of diseases and fungicide resistance, host immune response and resistance, and graduate training for future leaders. Transecting this work is a common theme: the generation of new knowledge to improve the future of plant production in Nebraska and beyond.

A few studies completed in the last year deserve to be highlighted. The most creative was a study completed by Srikanth Kodati to characterize *Rhizoctonia* species diversity from the Sandhills of Nebraska. His survey identified isolates that are pathogenic on both soybean and native grasses, suggesting that pathogens in soybean fields may have been present long before those regions were

cultivated. The most elegant study was performed by Rachel Persson, UCARE scholar, who genotyped a selection of *Sclerotinia sclerotiorum* isolates in order to identify SSR loci that can be reliably amplified using different methods from different labs. Results of her work showed that some SSR loci can be effortlessly harmonized, which will enable future studies to combine existing published genotype data for re-analysis. Among the most complex was a study completed by Julianne Matczyszyn that sought to evaluate whether there are associations between communities of plants and the communities of nematodes within the Great Smoky Mountains National Park. She collected and evaluated more than 300 environmental variables and plant species and applied numerous ordination methods to tease out patterns, ultimately showing that disturbance was the greatest predictor of nematode communities.

In total, three graduate students completed their thesis or dissertation this year, one undergraduate completed her UCARE project, two graduate students advanced to doctoral candidacy, and an uncounted number of posters and presentations were delivered!

 @SydneyEverhart

Van Etten Lab

The Van Etten laboratory continues to work on a range of topics associated with the molecular biology, biochemistry, physiology, ecology and bioinformatics of viruses that infect certain unicellular, eukaryotic chlorella-like green algae. Chloroviruses are found in freshwater all over the world and they have many interesting and unexpected properties. One property is that the chloroviruses are among the largest viruses known, containing as many as 16 tRNA-encoding genes and 400 protein-encoding genes, including many not previously reported in viruses. These genes encode DNA restriction and modification enzymes, hyaluronan and chitin biosynthetic enzymes, polyamine biosynthetic enzymes, ion channels and transporters, and many glycosyltransferases. The proteins encoded by some of the chloroviruses are either the smallest or among the smallest proteins of their class. Consequently, some of the chlorovirus-encoded proteins are the subject of intensive biochemical and structural investigation. Currently there are more than 450

publications on the chloroviruses and their gene products. In the past year, they published six manuscripts and two more have been submitted on the viruses. This year's publications were in *Nature Communications*, *J. Virology*, *J. Biological Chemistry*, *PLoS One*, *Channels*, and *Viruses*. Invited seminars were presented at the University of Florida, Kansas University, Harvard University, and four Universities in Taiwan. They currently have active projects with collaborators at Purdue University, University of Delaware, Johns Hopkins Medical School, three Universities in Italy (Milano, Genova & Naples), Germany (Darmstadt), and Israel (Israel Institute of Technology). The NSF-EPSCoR-funded project with the University of Delaware involves looking for chloroviruses in the unique alkaline lakes located in western Nebraska. There are only two other places in the world that have lakes similar to the ones in Nebraska. This research led to Dr. Van Etten being elected into the US National Academy of Sciences in 2003.



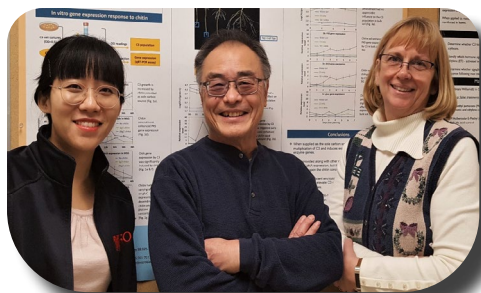
Pictured members: Dr. Jim Van Etten (advisor), Dr. Irina Agarkova, Zeina Al-Ameeli, Garry Duncan, David Dunigan, Dr. Jayadri Ghosh, Eric Noel, and Rebecca Richardson

Yuen Lab

Dr. Gary Yuen and his lab team celebrated 30 years of pursuing the “old” and the “new”. Christy Jochum, Research Technologist, has had a hand in every research project in the lab for over 20 years. An ongoing “old” research topic is the biological control of plant pathogens using *Lysobacter* enzymogenes C3, a bacterial agent discovered over 20 years ago by Dr. Loren Giesler when he was a student in the Yuen lab. Other former students, including Kyle Broderick, demonstrated effective control of fungal

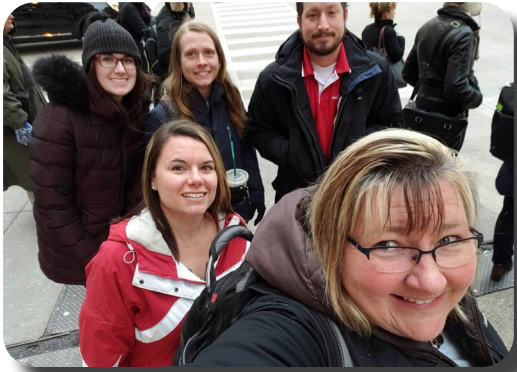
and nematode pathogens by *Lysobacter* C3 to involve the production of antibiotics and lytic enzymes and the induction of host resistance. This research is continuing through the efforts of graduate students Dongxue (Vivian) Shi and Jessica Walnut. Vivian's doctoral research focuses on gene activation in *Lysobacter* C3 during rhizosphere colonization. Jessica's work, which she completed for her master's degree in 2019, explored the induction of hormonal signaling in soybean by *Lysobacter* C3. Vivian and Jessica presented their research at the 2019 APS meeting, their travel supported in part by the Goss Memorial Scholarship and the Victor M. Rediger graduate student travel fund.

A “newer” project in the Yuen lab, funded by a Department of Energy grant, investigates resistance to rust and viral mosaic diseases in switchgrass, a native perennial being developed as a biofuel crop. Graduate student Anthony Muhle completed his master's degree in 2019 working on this project. The newest project in our lab evaluates fungal pathogen interactions with the soybean gall midge. This new insect-disease complex has caused increasing damage to soybean crops in eastern Nebraska and counties in neighboring states since 2018. The research is conducted in collaboration with the Department of Entomology and sponsored by the Nebraska Soybean Board. Katie Bathke, a freshman in Plant Biology, recently joined the lab team after being awarded the Robert and Karla Baltzell Student Innovation Award to conduct research on biological control of bacterial leaf streak disease in corn.



Members: Dongxue (Vivian) Shi, Dr. Gary Yuen (advisor), and Christy Jochum

Jackson-Ziems Lab



Members: (Back L-to-R) Gabriella Martens, Terra Hartman (2018), Brad Tharnish, (Front L-to-R) Jae Brungardt, and Dr. Tamra Jackson-Ziems

Within the last 2 years the Jackson-Ziems lab has undergone major changes! Former graduate student Terra Hartman, MS of Douglas, NE, graduated in December 2018. Her thesis research uncovered the wide host range and distribution of *Xanthomonas vasicola* pv. *vasculorum* (Xvv), causing bacterial leaf streak of corn. Terra now works for Bayer CropScience in Sabin, MN. Current graduate student Gabriella (Gabi) Martens of Wyoming, IA has continued the lab's work on Xvv and is studying the epiphytic population densities of the pathogen. Doctor of Plant Health (DPH) student, Callie (Meyer) Braley of Brule, NE, spent the summer of 2019 gaining experience conducting field research on management of soybean cyst nematode. We welcomed back Jae (Behn) Brungardt after her time at Iowa State University. We are excited to have her and Brad Tharnish back in the lab as full-time technologists! Together they manage the lab's activities, especially the field and greenhouse research trials. The lab commonly works with industry partners to evaluate the efficacy of foliar, in-furrow and seed treatment products to manage fungi, bacteria, and nematodes. Most of the lab's efforts are focused on corn and sorghum diseases, and more recently, soybean disease work following Dr. Loren Giesler's transition to department head. The lab averages about 30 efficacy trials per year, which provide research results for Nebraska Extension programming to help Nebraska producers and beyond to better manage crop diseases. The

lab group congratulates Terra on her win in the 2018 NC APS Outstanding Graduate Student Oral Presentation competition and Jae on her 2019 selection as the recipient of the first Lambrecht Plant Pathology Technologist Award! Bravo everyone and thank you!



Giesler Lab



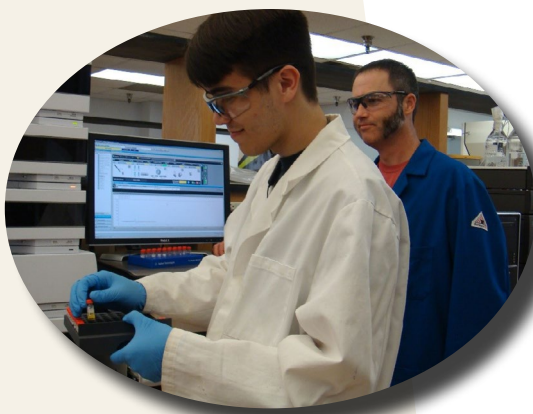
Loren with his two graduates, Nick Arneson and Vinicius Garnica

As a result of Dr. Loren Giesler becoming department head in September 2018, the soybean pathology lab was shut down after a 20-year run (starting in December 1999) of conducting applied research to address the primary diseases affecting Nebraska and U.S. soybean production. In 2019, the last two students (Nick Arneson and Vinicius Garnica) graduated with a MS in Plant Pathology. Over the years, this program focused on management of soybean viruses, *Phytophthora* root and stem rot, foliar and seedling diseases, and soybean cyst nematode. In December, the Nebraska Soybean Association acknowledged Dr. Giesler's commitment to soybean producers and Nebraska agriculture with the 2019 Soybean Promoter Award.

USDA-Agricultural Research Services Labs

Funnell-Harris Lab

Dr. Funnell-Harris' research involves systematically describing, using molecular and biological techniques, interactions of fungal pathogens with specific sorghum and wheat host genotypes, especially those with altered lignin and carbohydrate compositions and concentrations.



In Dr. Funnell-Harris' USDA lab, Patrick O'Neill (member), Biological Science Technician, oversees Mark Kilts, Biological Science Aid, using HPLC (High Performance Liquid Chromatography) to determine quantities of dhurrin, a compound that is a marker for drought tolerance in sorghum. Members not pictured: Dr. Deanna Funnell-Harris (advisor), Lois Bernhardson, and Dr. Maya Khasin.

Tatineni Lab

The main focus of Dr. Tatineni's lab research is virus-virus, virus-host, and virus-vector interactions of economically important wheat streak mosaic virus (WSMV), *Triticum* mosaic virus (TriMV), and High Plains wheat mosaic virus. Since these three viruses are transmitted by a common vector, wheat curl mite, mixed infection of wheat with two or three viruses is common in growers' fields with exacerbated yield loss. Dr. Tatineni's lab is working to understand how these viruses cause disease in wheat and identify the host and vector factors required

for completion of the virus infection cycle and use this information to disrupt the virus infection cycle through biotechnological approaches such as RNA-interference and gene editing. To achieve these goals, Dr. Tatineni and his team are examining viral gene functions through reverse genetics and biochemical and molecular biology approaches and identifying host and viral factors through protein-protein and protein-RNA interaction and bioinformatics studies.

The availability of GFP- or RFP-tagged WSMV and TriMV facilitated the examination of viral genes required for movement, disease development, superinfection exclusion (SIE), synergistic interaction, and mechanisms of Wsm1 and Wsm2 genes resistance in wheat cultivars against WSMV and TriMV. Recently, Dr. Tatineni's lab developed RNAi-based dual resistant transgenic wheat against synergistically interacting WSMV and TriMV. Currently, Dr. Tatineni and his team are working on: (1) mechanisms of SIE of WSMV and synergistic interaction between WSMV and TriMV; (2) virus-host interactions of WSMV to identify means of disruption and control of viral diseases; (3) virus-vector interactions between WSMV and wheat curl mites to identify ways to interrupt vector transmission; and (4) develop and characterize transgenic wheat for resistance to WSMV and TriMV and pyramid transgenes with natural resistance genes.



Lab Members: Dr. Satyanarayana (T.S.) Tatineni (advisor), Emma Sidel (undergraduate student worker), Jacob Ernest (undergraduate Student worker, Haritha Nunna (graduate Student), Sourav Pal (graduate student), and Jeff Alexander (biological science technician).

Update on the Plant & Pest Diagnostic Clinic from Kyle Broderick

The Plant & Pest Diagnostic Clinic (PPDC) had a busy and exciting year in 2019. In 2019, the PPDC received over 1,300 plant samples for disease diagnostics, herbicide injury, and nematode identification. This number was down slightly from 2018 due to the excessively wet conditions early in the season that delayed planting.

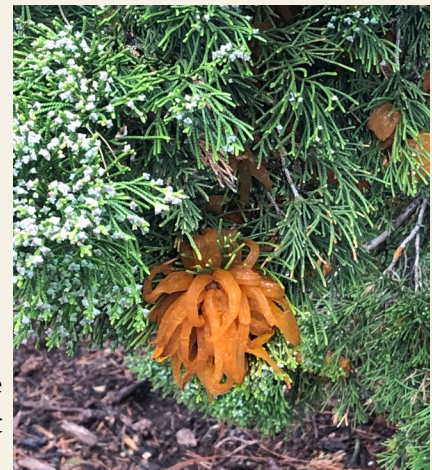
Fungicide-resistant *Cercospora sojina* (Frogeye leaf spot of soybeans) was detected in multiple fields in eastern Nebraska and will be a concern moving forward. Cooler, wet weather throughout the growing season also resulted in an increase in bacterial diseases such as Goss's Wilt and bacterial leaf streak of corn, bacterial blight and pustule of soybeans, and bacterial streak of wheat. In addition to the standard row crops (corn, soy, wheat, etc.) the PPDC also received a number of industrial hemp samples in 2019

Additionally, many foliar diseases of shade trees were observed in 2019. Gymnosporangium rusts (cedar-apple rust, pear rust, etc.) were able to establish themselves early in the season, and timely rains throughout the summer provided ideal conditions for disease development.

Sudden Oak Death, caused by the regulated pathogen *Phytophthora ramorum*, was detected on rhododendrons from all over Nebraska after a nursery in Oklahoma shipped infected plant material. *P. ramorum* has a very broad host range that includes over 500 different species of both woody and herbaceous hosts. This disease has become a major problem in the Pacific Northwest, however, it has not established itself in Nebraska. Fortunately, due to the drier climate in Nebraska, *P. ramorum* is not expected to be a major problem here; however, microclimates within landscapes may provide a favorable environment for infection.



Cercospora sojina



Cedar-apple
rust



*Phytophthora
ramorum*

Plant Pathology Graduate Student Awards

Samuel Eastman: Goss Memorial Scholarship

Thais Egreja: Milton E. Mohr Biotechnology Fellowship

Karen Ferreira da Silva: Hardin Distinguished Graduate Fellowship Award, APS Foundation I.E. Melhus Student Speaker Symposium Award, UNL Graduate Student Travel Award, American Society of Agronomy's Graduate Student Leadership Conference Award, UNL Graduate Student Association Travel Award, Goss Memorial Scholarship, Victor M. Rediger Travel Award, APS North Central Division 3rd Place Oral Presentation

Nikita Gambhir: Stuard D. Lyda Student Travel Award, John F. Schafer Student Travel Award, Milton E. Mohr Fellowship Award, 1st Place team for Best Use of External Data at the UNL Computing Center Datapalooza 2019, Victor M. Rediger Student Travel Award, Goss Memorial Scholarship, UNL Office of Graduate Studies Graduate Student Travel Award

Natalie Holste: ASV Travel Award, Walker Fellowship Fund for Graduate Students in Botany, Botany Department Memorial Fund

Srikanth Kodati: Widaman Distinguished Graduate Fellowship Award, H. David Thurston Student Travel Award, Goss Memorial Scholarship, Victor M. Rediger Travel Award

Katherine LaTourrette: 2nd Place poster at the Supercomputing & Life Sciences Symposium, Assistantship to attend the Midwest Big Data Summer School

Julianne Matczyszyn: Goss Memorial Scholarship, Society of Nematology Corteva AgriScience Student Travel Award

Dongxue (Vivian) Shi: Goss Memorial Scholarship, Victor M. Rediger Travel Award

Jessica Walnut: Goss Memorial Scholarship, Victor M. Rediger Travel Award



Dr. Loren Giesler (department head), Dr. Srikanth Kodati (Widaman Distinguished Graduate Fellowship recipient), Karen Ferreira da Silva (Hardin Distinguished Graduate Fellowship recipient), and Dr. Sydney Everhart (advisor) at the IANR Fellowship Luncheon, October, 2019

FRESH FACES



Amber Hadenfeldt
Administrative Associate

I received my bachelor's and master's degrees in English from the University of Nebraska-Lincoln, with specializations in literature, Film Studies, and Women's and Gender Studies. I enjoy spending time with my loved ones including my two cats – Bug and Kyd. I've been collecting rocks since I was very little and attended the world's largest gem and mineral show in Tucson last February. In the last two years I've been growing a small collection of houseplants, my favorite of which is a Pothos that spans the length of the living room wall and is named after the great Stevie Nicks. I am a Lincoln native with over five years of experience providing administrative support to UNL faculty and students. I'm enjoying my new role as Administrative Associate and getting to know everyone in the department. Thank you for being such a welcoming group!



Madilyn McKay
Office Associate

I am a Nebraska native, hailing from Omaha. However, I have lived in Lincoln for the past 6 years. I am a fairly recent graduate of UNL; I obtained my bachelor's degree in Biological Sciences in December of 2017. In my free time, you can usually find me in the kitchen baking treats, or out on some adventure. I love to travel, especially to the mountains. This summer, I will be heading to Glacier National Park for the first time and I am very excited to explore and take in the beauty. I spent 4 years working for Landscape Services here at UNL and I have also worked for the greenhouse with the City of Omaha. You could say I enjoy both indoor and outdoor gardening and I'm excited to learn more as I continue to take on this new journey with the University. I'm grateful for my new role here in our department and I look forward to continue getting to know all of you! Thank you for making the last couple of months an easy transition for me!

FRESH FACES



Sergio Manuel Gabriel Peralta
PhD Student, Everhart Lab

I am from Oaxaca, Mexico. I rejoined the Department of Plant Pathology in the fall of 2019 in the Everhart Lab. I am interested in plant pathology because the interactions between pathogens and plants create a never ending race. I like to drive to new places and love motorcycles.



Asha Mane
PhD Student, Everhart Lab

I am from Maharashtra, India. I received my master's degree in Plant Sciences from the University of Hyderabad. I joined the Department of Plant Pathology at UNL, in August 2019. I am interested in investigating the epidemiology of fungal plant pathogens. When I am not working, I enjoy reading and exploring food from different countries. I also love to travel and had an opportunity to visit Nederland, Colorado for a ski trip. I look forward to traveling more in the upcoming years. I am grateful to the Department of Plant Pathology for providing a very positive environment with great learning opportunities. Thank you all for the warm welcome.

RETIREMENTS



After 50 years of service to the Department of Plant Pathology, Dr. Jim Steadman retired in May of 2019 and was granted emeritus status. His contributions to not only the department and the University, but to the field of plant pathology, are numerous. He is currently spending his days relaxing and spending time with his wife, Terri, in Lincoln, Nebraska.

Margaret Denning retired after 15 years of service to the Department of Plant Pathology as the administrative associate and office manager. Since retiring in November of 2019, she has welcomed a new grandchild and has been thrilled to spend time with her other grandchildren.

In Remembrance

James “Jim” Robert Alfano

June 2, 1963 - November 21, 2019



James “Jim” Robert Alfano, 56, passed away at home surrounded by his loving family and dog Cookie on November 21, 2019, after a long, private, and courageous fight with cancer. He was extremely thankful for all the support he received from family, friends, and his health care team.

Born June 2, 1963, in Glendale, CA, to Joe and Dorothy Alfano, Jim spent his childhood years in Simi Valley, CA. He was the youngest of five siblings.

Jim was a Bessey Distinguished Professor in the Center for Plant Science Innovation and the Department of Plant Pathology at the University of Nebraska-Lincoln, and served as the Director of UNL’s Undergraduate Microbiology Program. He loved being a Husker and spent many hours cheering on the volleyball and football teams.

Jim earned a PhD in Microbiology in 1993 at Washington State University, followed with postdoctoral training at Cornell University from 1993 to 1997. He was an Assistant Professor at the University of Nevada, Las Vegas, from 1997 to 2000 before joining the faculty at the UNL.

A giant in the field of molecular plant microbe interactions, Jim was passionate about his work but foremost enjoyed the interactions he had with many students, postdoctoral associates, colleagues, and friends. He was charismatic, inspirational, and a true leader. He is remembered by many as the big guy with a quick smile and infectious laugh.

In recognition of his many contributions to science and research, Jim received numerous accolades including the American Phytopathological Society’s Syngenta Award (2005), named a Charles Bessey Professor at UNL in 2010, a fellow in the American Phytopathological Society in 2011, and a fellow in both the American Association of Advancement of Science in 2012 and American Academy of Microbiology in 2015.

While he was proud of his scientific achievements, Jim would be the first to say that what he cherished above all was his daughter, Isabella Alfano, born in 2007, to Jim and his wife Karin van Dijk. Isabella (Izzy) was absolutely and completely adored by Jim. Fatherhood transformed Jim, personally and spiritually, where in this role, his top priority was to ensure Izzy believed in herself, as he believed in her.

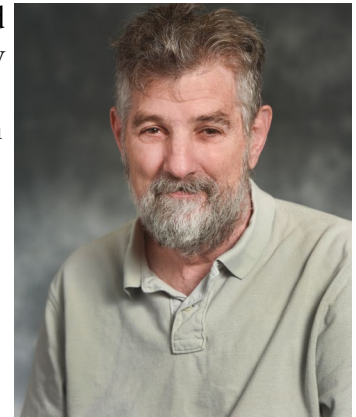
Jim was preceded in death by his parents Joe and Dorothy Alfano, and his father-in-law, Klaas van Dijk. He is survived by his wife Karin; daughter Isabella; siblings Maryann (Kris), Victor (Cathy), Joe (Christy), and Joan; nephews and nieces Taylor, Joe, Jim, Allison, Keturah, and Sasha; mother-in-law Estelle van Dijk; sisters-in law Mariette and Miriam (John), and many friends.

In Remembrance

Martin “Marty” Bruce Dickman

February 16, 1950 - December 2, 2018

Martin B. Dickman was born in Flushing, New York, on February 16, 1950 and died in Santa Barbara, California, on December 2, 2018. In his 68 years, Marty lived a full and productive life. He received his PhD in Plant Pathology at the University of Hawaii, and became a world renowned speaker and authority in his field. He was a professor at the University of Nebraska for 20 years, then was named a Distinguished Professor and Director of the Institute for Plant Genomic and Biotechnology (IPGB) at Texas A&M University for the past 13 years. He received numerous awards and recognition of his contributions to science, and edited many prestigious journals worldwide. He loved his work, and especially enjoyed mentoring students and faculty (all of whom he considered family), and collaborating with colleagues across the globe.



Although Marty was distinguished in his chosen field, he was sarcastically irreverent and loved to joke and poke fun at himself and others throughout his life. He was down-to-earth and unpretentious. Marty had a big personality, and was fiercely competitive until slowed by his health issues, excelling at basketball, ping-pong, and racquetball. He was a sports fan, and rooted for the A&M Aggies and Nebraska Cornhuskers, especially. He loved movies and music, and would listen to Bob Dylan and Bruce Springsteen amongst others for hours, with his musical passion dating back to his attendance at Woodstock in 1969.

Marty was born to Irving and Beatrice Dickman and grew up in Long Island with his younger brothers Donald and Gary and baby sister Denise. His love of the ocean and surfing drew him to Hawaii in 1970, where he met the love of his life, Duana Smith, on a beach in Maui in 1972. They were soon married and started a family of their own with three children born in Hawaii and the fourth in Nebraska. He loved and wanted the best for all his kids, and became a loving “Papi” to his nine grandchildren. Marty credited Duana as the best thing that ever happened to him. They were soul mates and grew up together over the years. Marty retired in July 2018 and they moved to Duana’s hometown, Carpinteria, California, to live near the ocean that he loved so much.

Marty is survived by his loving wife Duana, his children Dion (Linh) Dickman, Crystal Heinicke, Derek (Cate) Dickman, and Jayde Dickman, his grandchildren Malakai and Acora Heinicke, Senen, Khai, Ascher, Weston, Mason and Brooks Dickman and Wyatt Smith. He is also survived by his mother Beatrice, brothers Donald and Gary Dickman, sister Denise Spiegler, and numerous brothers- and sisters-in-law and nieces and nephews.

In Remembrance

Edward “Eddie” Anthony Hillman III

July 23, 1992 - November 25, 2018



Edward “Eddie” Anthony Hillman III, 26, of Armstrong, passed away suddenly at 9:29 a.m. Sunday, November 25, 2018, at the University of Nebraska Medical Center. Eddie was born July 23, 1992, in Danville, the son of Edward and Becky (Creighton) Hillman Jr.

Eddie graduated from Eastern Illinois University (EIU) in 2014. He graduated with honors and departmental honors. While at EIU, he was president of the RHA.

After graduating from EIU, Eddie began teaching physics and chemistry at Armstrong High School. He also had a great love for archery and served as the archery coach at Schlarman Academy. In the fall of 2016, Eddie moved to Nebraska where he served as a graduate research assistant at the University of Nebraska while pursuing his PhD in Plant Pathology. Eddie was a member of the Mycological Society of America.

He loved archery, kayaking, long boarding, playing his guitar and playing video games and Dungeons and Dragons. Eddie was always known for his great sense of humor and how he would do anything for anybody. He would always find a way to help people solve their problems. Eddie touched so many lives and he will be greatly missed by all who knew him and loved him.

Dr. Roy C. French

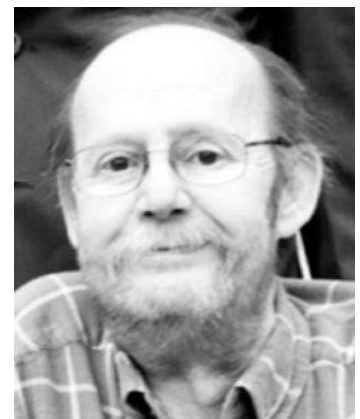
May 14, 1950 - November 6, 2018

Dr. Roy C. French, age 68, sadly passed away on November 6 in Minneapolis. Son of Franklin and Hazel French, Roy was born in Colorado Springs, Colorado. He was married to his wife, Mina, for 41 years and of this marriage were two children, Kenny of Kenosha, Wisconsin, and Jean (Joe) Zierke of Minneapolis, and grandson Rylan Zierke. He is also survived by his loving family, siblings Nancy Gunn and Franklin French, and his extended family in Nepal.

Roy joined the Peace Corps in 1972 to help the people of Nepal. That is where he met his wife, Mina; they were married in Kathmandu in 1976. He taught agricultural education and English in two Peace Corps stints; Pokhara and various Nepali villages.

Roy received his Bachelor of Science degree in Plant Pathology at Colorado State University in 1977, a PhD from Louisiana State University in 1983, and did his post doctorate at the University of Wisconsin. He researched plant viruses for the United States Department of Agriculture and was an adjunct faculty member for the Department of Pathology at UNL, retiring in 2013.

He had over 80 academic publications tied to his research, especially tied to wheat streak mosaic viruses.



In Remembrance

David S. Wysong

April 20, 1934 - October 27, 2018



David S. Wysong, 84, of Lincoln, passed away October 27, 2018. David was born on April 20, 1934, to Noel B. and Dorothy E. (Michener) Wysong in Kentucky and raised in Park Ridge, Illinois. Between 1953-1956, David served in the Army Signal Corps (as a cryptographer) in Korea.

After a three year courtship, David married Sally Goodfriend in 1958. David earned his bachelor's and master's degrees at Colorado State University and his doctorate in Plant Pathology at the University of Illinois, Champaign-Urbana. David and Sally had five children. Sally died in 2000, after a five-year battle with ovarian cancer.

David enjoyed a fulfilling career as a professor of Plant Pathology and Extension Specialist at the University of Nebraska-Lincoln, with his work on plant diseases and their management with farmers, foresters, and extension agents. He was the second full-time extension plant pathologist in the state, being hired in 1964.

Taking up flying, David discovered the beauty of Nebraska from the air. Due to this passion, he became one of the pioneers in the development of aerial applications of fungicides on crops, conducting "operation safe" flying clinics to applicators. He was instrumental in the discovery and characterization of the bacterial disease of corn, Goss' wilt, in 1969 with Dr. Anne Vidaver, and Dr. Max Schuster, while also identifying new inbred corn lines and hybrids that were tolerant to Goss' wilt with Dr. Ben Doupnik. David was also a panelist for 31 years on Backyard Farmer. David retired in 1995 as professor emeritus after more than 30 years of service with UNL.

David met Marilyn Allen during a medical mission trip to Mexico in 2002 and they've been together ever since. David and Marilyn have enjoyed dancing, traveling, and spending time together. He has frequently commented that he is so fortunate to have loved two women who have loved him back just as deeply.

Michael G. Boosalis

September 20, 1917 - July 4, 2017

Boosalis was born Sept. 20, 1917, in Fairbault, Minnesota, to Gus and Mary (Prokovakis) Boosalis. He served in the U.S. Army Air Corps during World War II and was a bombardier on a B-24 Liberator while stationed in Italy. In 1951, after earning a bachelor's degree and doctorate at the University of Minnesota, Boosalis joined the University of Nebraska's Department of Plant Pathology, teaching and conducting research on plant diseases. From 1964 to 1984, Boosalis served as chair of plant pathology. He retired in 1988, but continued to conduct research until the age of 97.

Boosalis was also a proud supporter of his wife, Helen Boosalis, a political pioneer who was Lincoln's first female mayor and a 1986 gubernatorial nominee.





As we are in our Centennial Year as a Department of Plant Pathology, we are asking for your help to provide a legacy of support. Over the past century, many things have changed, but our goal to produce world-changing scientists remains the same. This is our focus as we start our next century of discovery, innovation, and education in the Department of Plant Pathology at the University of Nebraska-Lincoln. The Plant Pathology Department Excellence Fund has been established to provide continued and increased opportunities for future students. It is critical that our students are exposed to a diverse set of experiences to help them become effective leaders. Teamwork, leadership, interpersonal skills, collaborative projects, community outreach, teaching, and communication with diverse audiences are examples of qualities we want our students to grow in by encouraging their participation in rewarding activities.

Please consider donating to this fund to ensure opportunities for our students and our department continue to grow as we address food production challenges to feed our world's growing population. All donors who pledge to give \$125 or more will receive a copy of "A Century of Plant Pathology in Nebraska" by Dr. Bob Harveson, a publication detailing the history of our 100-year presence at the University of Nebraska-Lincoln. Thank you for helping us celebrate our Centennial Year and provide a legacy of support for our department and future students.

To make a contribution to this fund, please visit: go.unl.edu/plantpath-excellence