Title:	Multi - barrier Management Strategies of Phytophthora blight in Peppers and Cucurbits

Sponsoring Agency	NIFA	**Project Status**	ACTIVE
Funding Source	Non Formula	**Reporting Frequency**	Annual
Accession No.	1031511	**Grants.gov No.**	GRANT13886442
		Award No.	2023-51181-41318
Project No.	NMSANOGO-23G	**Proposal No.**	2023-05652
Project Start Date	09/15/2023	**Project End Date**	09/14/2027
Reporting Period Start Date	09/15/2025	**Reporting Period End Date**	09/14/2026
Submitted By	Claire Montoya	**Date Submitted to NIFA**	09/15/2026

Program Code: SCRI **Program Name:** Specialty Crop Research Initiative

Project Director
Soum Sanogo
575-646-3577
ssanogo@nmsu.edu

Recipient Organization
NEW MEXICO STATE UNIVERSITY
1050 STEWART ST STE E1200
Las Cruces, NM 880038001
DUNS No. 173851965

Performing Department
{NO DATA ENTERED}

Co-Project Directors
Lozada, Dennis

Departments
{NO DATA ENTERED}

Non-Technical Summary

Phytophthora capsici, causal agent of Phytophthora blight, is a serious pathogen in vegetable crops worldwide. **The goals** of this transdisciplinary SREP project are to develop a system-based approach that significantly reduces the risk of Phytophthora blight. We envision the development of a novel Phytophthora Management Risk Index (PMRI) based on integrating five risk components: Phytophthora Inoculum Level, Moisture, Host Resistance, Fungicide Resistance, and Soil Health. This practical concept provides an assessment of the risk of Phytophthora blight in any system and can be used to guide the incorporation of strategies to help minimize disease risk. We are proposing innovative strategies to significantly reduce losses to P. capsici and increase yield and profits. **Our objectives** are to: **i)** evaluate genetic diversity among isolates of P. capsici; **ii)** identify P. capsici-resistant genotypes that are more tolerant to drought or flooding; **iii)** develop sensitive diagnostic tools for detecting infection, and develop multi-barrier management strategies; and **iv)** evaluate economic and social impacts of developed strategies, and to disseminate knowledge and techniques generated through education and Extension outreach. The project will provide stakeholders with a new risk-based management approach (PMRI) using innovative integrated strategies. Our objectives address **five SCRI Focus Areas**: i) Research in plant breeding and genetics (25%); ii) Efforts to identify/address threats from pests and diseases (30%); iii) Efforts to improve production efficiency/profitability (10%); iv) New innovation and technology (25%); and v) Methods to prevent, detect, monitor, control food safety hazards in specialty crops (10%).

Accomplishments

Major goals of the project

Hypotheses, Objectives, and Goals

The long-term goal of this project is to develop an economically profitable multi-barrier system to manage P. capsici on vegetable crops based on sound research-based of information on water and soil management, cultural practices, varietal resistance, and fungicide programs for disease control to reduce the activities of this pathogen in field production and postharvest environment. Knowledge gained through this project will be translated into actionable recommendations and disseminated to stakeholders using avenues such as on-farm experiments and demonstrations, field days, workshops, producer meetings and conferences, project-specific websites, and news releases through websites and Extension offices.

Hypothesis 1: Populations of Phytophthora capsici are genetically diverse and genetic diversity in P. capsici may significantly

affect potential management options of the pathogen.
Objective 1: To conduct a nationwide survey of genetic diversity of isolates of P. capsici from irrigation water and vegetable fields.
1a). To determine the genetic diversity within and range of sensitivity of the isolates of P. capsici to currently used fungicides.
1b) To quantify and to better understand the potential relationship between the genetic diversity of the soil microbiome and P. capsici populations.
The overall goal is to provide guidance on gauging potential disease development based on pathogen genetics, fungicide sensitivity, and the soil microbiome to test the durability of disease mitigation strategies across a spectrum of soil types.

Hypothesis 2: Utilization of P. capsici-resistant crop cultivars with tolerance to extreme environmental footprints (e.g., drought or flooding) will reduce Phytophthora blight and increase crop yield.
Objective 2: To identify and evaluate crop cultivars, accessions, scion-rootstock combinations with P. capsici resistance that may also be more tolerant to drought and flooding.
2a). To evaluate resistance of pepper and cucurbit accessions and scion-rootstock combinations to different genetic groups of P. capsici identified in Objective 1.
2b). To breed for resistance of pepper and cucurbit to P. capsici.
2c). To assess stability of disease resistance under drought and flooding conditions.
The overall goal of the screening and breeding effort in pepper and cucurbit is the identification or development of lines with attributes in reducing the rate of infection, reducing soil inoculum potential (genetic soil disinfestation), while maintaining resistance under drought and flooding conditions, and identifying microbiome that is antagonistic to P. capsici and yet stimulatory to plant growth.

Hypothesis 3: Rapid and sensitive detection of P. capsici and integrated management strategies will result in improved management of Phytophthora blight.
Objective 3: To develop rapid and accurate diagnostic procedures for plant infection by P. capsici and develop multi-barrier strategies for effective management of the disease.
3a). To develop real-time diagnostic assays, including the use of Oxford Nanopore Technology (ONT), a promising sequencing technology, for on-site detection of P. capsici in irrigation water, plants, and postharvest fruit samples.
3b). To develop multi-barrier management strategies incorporating sensitive disease detection, resistant plant genotypes, and tolerance to drought and flooding.
3c) To quantify the effects of multi-barrier management strategies on disease and soil microbiome.
The overall goal is to develop sensitive and rapid disease detection methods to guide implementation of multi-faceted disease management programs that include preventing disease outbreaks, and reducing disease levels through disease resistance, tolerance to environmental footprints (drought and flooding), improved soil health, and improved food quality and safety.

Hypothesis 4: Management approaches developed in the project will provide the most economically profitable options with greater social impacts to producers engaged in the production of vegetable crops challenged by P. capsici.
Objective 4: To evaluate the economic and social impacts of developed integrated strategies and to disseminate knowledge and techniques generated through education and extension.
The overall goal is to provide producers and other stakeholders with research, extension, and educational materials on the efficacy and profitability of managing P. capsici using integrated strategies.

What was accomplished under these goals?

Objective 1. In Arizona**, Co-PI Hu** has recovered 55 isolates of P. capsici from a chile pepper farm and characterized them based on morphological features, sequencing data, and sensitivity of the isolates was evaluated in vitro against the fungicides mefenoxam, fluopicolide, ethaboxam, mandipropamid, oxathiapiprolin, dimethomorph, cyazofamid, and ametoctradin + dimethomorph. Preliminary results based on mycelial growth indicated that all isolates are sensitive to all fungicides. Overall, no widespread pre-existing fungicide resistance is apparent in the isolates. **Co-PI Hu** has a field trial currently underway at Curry Farms in Pierce, AZ, to evaluate multi-barrier strategies for Phytophthora blight management in pepper. The trial includes five pepper genotypes with different levels of resistance to P. capsici and treatments consisting of an untreated control, a fungicide treatment, a mixture of biocontrol agents, and a combination of the fungicide and biocontrol agents. Disease development and plant survival are being monitored throughout the growing season. **Co-PI Barberan** is assisting in the field work initiated by **co-PI Hu** and will sample soil from Curry Farms and complete molecular work later this year. **In New Mexico, co-PI Lozada** has collected, and is currently maintaining, a total of 54 P. capsici isolates at NMSU. These isolates were collected from New Mexico, Illinois, Arizona, Florida, Texas, and New York. **In Illinois, co-PI Babadoost** conducted a field experiment with 12 treatments in a hot-spot area for P. capsici to determine the effectiveness of potential fungicides for managing P. capsici in pumpkins. This experiment is being conducted in a major pumpkin production county

(Tazewell County) in Illinois. **In Mississippi, co-PI Ali** is evaluating essential oils (palmarosa, clove bud, black seed, oregano, red thyme, and cinnamon) for the management of P. capsici. Preliminary results indicated that the tested essential oils inhibited the mycelial growth of P. capsici, demonstrating their potential for disease management. This research is ongoing. **In New Jersey, co-PI Wyenandt** is collecting isolates of P. capsici and evaluating various fungicides. He has conducted presentations related to extension and outreach at various meetings.

Objective 2. In New Mexico, co-PI Lozada has started conducting a greenhouse study involving hybridization between NMRILs for stacking of Phytophthora root rot resistance and development of synthetic RIL (SynRIL) and stacked RILs (StackRIL) populations. This research is ongoing. C**o-PI Djaman** compiled results from his first two seasons of field experiments and presented the findings at the ASA-CSSA-SSSA international meeting in November 2025. **In Texas, co-PI Crosby** is crossing multiple watermelon populations with high-quality Citrullus lanatus parents to C. amarus to assess fruit rot resistance. C. mucuspermus resistant species were grown in a field at Weslaco in Fall 2025 to produce fruits. Those fruits were inoculated with hyphal plugs using a local P. capsici isolate with high virulence. Very low levels of resistance in the progeny suggest a low heritability and a quantitative trait, as the resistant parents were not symptomatic. Of the 14 Sunshade x (PI 189225 x Sunshade) F2 watermelons screened, 4 fruit displayed strong resistance. Of the 21 Penghu x (Penghu x PI 186489) F2 watermelons screened, zero fruit showed full fruit rot resistance. Of the 32 Jalisco x (PI 189225 x Jalisco) F2 watermelons screened, 2 fruit displayed strong fruit rot resistance. Of the 10 Jalisco x (PI 560020 x Jalisco) F2 watermelons screened, zero fruit displayed any fruit rot resistance.

Objective 3 / Objective 3a. In Florida, co-PI Dufault is studying the effects of biocontrols, soil additives, and elemental sulfur in the suppression of P. capsici-associated disease and on the soil microbiome in watermelon plants under controlled conditions. Watermelon seedlings were grown and maintained in a climate-controlled greenhouse, inoculated with P. capsici, and received weekly soil drenches with either a bacteria-based biocontrol product (Double Nickel LC; Bacillus amyloliquefaciens), and fungi-based biocontrol product (RootShield Plus WP; Trichoderma spp.), or a pre-plant application of the organic soil amendment Everlizer (poultry straw and crushed crab shells). An additional treatment combined Double Nickel LC with an elemental sulfur product (Optimas). Differences in disease incidence and severity between treatments were observed. Statistical analysis is currently being performed to verify this. **Co-PI Dufault** has set up a second field trial to study the effects of systemic fungicide KPhtie 7LP and elemental sulfur in the suppression of P. capsici-associated disease in watermelon plants under field conditions. The trial is currently ongoing and stand count and disease incidence are being assessed weekly until harvest.

In Mississippi, co-PI Ali collected one additional P. capsici isolate from Mississippi vegetable crops in 2025-2026. Identification was confirmed via conventional PCR. An initial ONT-based protocol for the rapid detection of P. capsici has been developed and is currently being optimized under laboratory conditions. In addition, ONT sequencing was performed, and two LAMP primer sets have been designed based on sequence comparisons for the accurate identification of P. capsici. **In New Mexico**, **co-PI Sabillon**, who replaced co-PI Fedio, has received soil water samples from Project Manager Fechner for detection of P. capsici. **Co-PI Sabillon** will be working on analyzing these samples and present results at the 2027 Spring Institute for Phytophthora Research and Extension.

Objective 3/ Objective 3b. In New Mexico, **co-PI Sanogo** has conducted greenhouse and field experiments to evaluate the use of a combination of biological fungicides (Actinovate, Root Shield, and Double Nickel) and mycorrhizal inoculant (MycoApply Endo and MycoApply Soluble Maxx) against P. capsici in chile pepper at different application rates. Preliminary results suggest that the addition of biological controls mixed with mycorrhizal inoculant does not provide any additional suppression of P. capsici. This research is ongoing. **Co-PI Lozada** conducted HiFi and Hi-C integrated assembly to generate a haplotype-resolved assembly of P. capsici isolate 6347. The draft assemblies span 75.7 Mbp for haplotype 1 and 725 Mbp for haplotype 2 with contig N50 greater than 3 Mbp and zero gaps. This size difference can indicate heterozygosity, structural variation, and/or differences in repetitive element content. The longest contig is 8.32 Mbp for haplotype 1 and 6.89 Mbp for haplotype 2. BUSCO and the 5522 gene phytophthora_odb12 lineage dataset identified the percentage of expected single cope orthologs that were captured. Haplotype 1 is 98.9% complete, with 96.7% single-copy and 2.2% duplicated BUSCOs. Haplotypes 2 is 98.3% complete, with 97.4% single-copy BUSCOs and 0.9% duplicated BUSCOs. Both haplotype assemblies are virtually complete and well-separated. This assembly is one of the most contiguous assemblies available for P. capsici. **In Texas, co-PI Somenahally** is studying the impact of organic amendments on P. capsici suppression in chile peppers. Experimental treatments included a combination of anaerobic soil disinfestation, mustard seed meal, biochar, and forest soil inoculation with poultry manure. Chile pepper plants inoculated with a P. capsici isolate. Shannon diversity index of bacterial and fungal communities did not differ significantly among treatments. No disease symptoms were observed in any treatment.

Objective 4. More than 45 products were generated, consisting of abstracts and other publications, including journal articles, presentations, theses, field days, and extension/outreach materials. These products provided scientific information to farmers, post-harvest handlers, producers, and the general public.

What opportunities for training and professional development has the project provided?

Many co-PIs were engaged in hiring undergraduate, graduate, post-graduate personnel, and temporary employees. Co-PIs and post-graduate personnel provided training in pathological and microbiological techniques, developing skills in

experimental design and data collection, and in presenting research projects to stakeholders and in scientific society meetings. Personnel has gained experience in conducting meetings and workshops, summarizing research, and extension/outreach to growers, producers, stakeholders, and other relevant parties.

How have the results been disseminated to communities of interest?

More than 45 products were generated, consisting of abstracts and other publications, including journal articles, presentations, and extension/outreach materials. Results have been disseminated through conferences, posters, oral talks, field and grower visits, and outreach events. In February 2026, the Spring Institute for Phytophthora Research and Extension was held in Las Cruces, NM, in conjunction with the 2026 Annual New Mexico Chile Conference. This event brought in growers, stakeholders, researchers, teachers, and students from around the nation to learn about updates in phytophthora-based research in peppers and cucurbits. This event concluded with an open forum and a working lunch for any interested parties to ask questions or discuss ongoing research. Additionally, information has been disseminated through outreach to elementary, middle, and high school students at participating events. Other meetings included the 2026 Plant Health meeting of the American Phytopathological Society ACA-CSSA-SSSA, Southern American Society of Agronomy, CANVAS 2026, Pest Identification, Pest Management, and Pest Control workshop, annual meeting of the American Society of Horticulture, annual meeting of the Southern Region of the American Society of Horticultural Science, Illinois Specialty Crops Meeting, Southern Illinois Vegetable Growers Meeting, Northern Illinois Vegetable Growers Meeting, Tenth Edition of Global Congress on Plant Biology and Biotechnology, In-Service Training of Missouri Agricultural Extension Educators, Amish/Mennonite Vegetable Growers Meeting on Cucurbits, Career Days, and Field Days.

What do you plan to do during the next reporting period to accomplish the goals?

In Arizona, **co-PI Hu** is conducting comprehensive data analysis and drafting a manuscript for sensitivity to fungicides. He is determining the possible trends in the development of fungicide resistance in the P. capsici populations and will be collecting and analyzing data from the thermal growth study. Data analysis of the complete panel may reveal whether some isolates tolerate higher temperatures, which could affect disease risk windows, greenhouse screening conditions, and possibly the choice of temperature for fungicide assays. He will repeat the trial of characterizing virulence diversity and race structure of P. capsici isolates next year with earlier planting and machine planting. **Co-PI Barberan** will continue to collect soil samples in Curry Farms, Pierce, AZ, and conduct microbiome analyses.
In New Mexico, **co-PI Lozada** will continue to collect P. capsici isolates from other collaborators for maintenance at NMSU. He will conduct a pangenome analysis for 23 isolates with whole genome sequence data following the whole genome assembly. This will be conducted following the Pangenome analysis pipeline of the National Center for Genome Resources (NCGR) in Santa Fe, NM. A sequence graph will be constructed in VG toolkit to represent the genomes of multiple isolates that shows the genetic variations as paths in the graph. Connections (edges) between the contigs (nodes) will be visualized using the Graphical User Interface (GUI) software Bandage. Basic Local Alignment Search Tool (BLAST) embedded in Bandage will be used to build a local BLAST database and preform local BLAST searches. Genetic variations can be called from the use of MiniGraph-Cactus, where the variations can be extracted into a file. Using these analyses, core, dispensable/accessory, and unique genomes from the collection of P. capsici isolates will be distinguished. He will also develop a SynRIL from a multi-parent population using 12 founder NMRILs and StackRIL using a different set of 12 founder NMRILs. **PD Sanogo** will be collecting second year results from the ongoing pepper biological fungicide study in the field and will repeat the complementary greenhouse study. He will also be conducting an experiment evaluating genetic soil disinfestation using P. capsici in resistant pepper genotypes compared to susceptible genotypes and continue to maintain, update, and design aspects of the phytophthora.nmsu.edu by adding presentations, posters, and other relevant information related to the project. **Co-PI Djaman** will collect results from his water-saving irrigation regime field experiments. His Ph.D. student is conducting an experiment on integrated management of soil amendment, mycorrhizae fungi, chile genotypes, and irrigation strategy for the suppression of Phytophthora capsici in chile pepper production. He is testing soil amended with biochar, the application of mycorrhizae fungi, and six varieties of chile peppers under full irrigation and two water saving irrigation regimes after the plants are artificially inoculated with P. capsici. ?**Co-PI Sabillon** will work with Project Manager Fechner to continue collecting soil water samples for detection of **P. capsici**. **Co-PI Acharya** will continue his survey on the risk of P. capsici and conduct economic analyses of experimental data received from other co-PIs.
In Illinois, **co-PI Babadoost** will collect results of his ongoing fungicide field trial to disseminate to cucurbit growers, and will set up experiments for the 2027 growing season.
In New Jersey, **co-PI Wyenandt** will continue his fungicide trails and collect P. capsici isolates for characterization.
In Texas, **co-PI Crosby** is preparing transplants of the BC1F2 populations and most resistant single plant selections for planting in the field at Weslaco for the Fall 2026 season. These will generate fruit for inoculation again to verify the most resistant population and progeny. In addition, seeds of the few resistant selections from the 2025 greenhouse fruit inoculations have been planted in the greenhouse to backcross again to the high-quality recurrent watermelon parents during Fall 2026. **Co-PI Somenahally** will continue to evaluate the best methods for inoculation in the greenhouse and continue with his evaluation of added organic matter.

Accession No. 1031511 **Project No. NMSANOGO-23G**

In Mississippi, **co-PI Ali** will continue to collect P. capsici isolates and optimizing LAMP primer markers during the next year. He will also continue his evaluation of essential oils for use as biocontrol agents against P. capsici and identify the most effective ones.
In Florida, **co-PI Dufault** will send soil samples collected during field trials to Waters Ag for testing to determine whether applications of Everlizer had any measurable effect on soil pH, calcium, or organic matter ober the course of the season. Additional soil will be sent to **co-PI Somenahally** for soil microbiome testing to potentially determine whether the sampled treatments produced any measurable effect on the soil microbiome or P. capsici populations. and commercial soil test services and continue to collect P. capsici isolates and maintain contact with UF extension experts and agents.

Participants

Actual FTE's for this Reporting Period

Role	Non-Students or faculty	Students with Staffing Roles			Computed Total by Role
		Undergraduate	Graduate	Post-Doctorate	
Scientist	0.5	0.5	0.5	1	2.5
Professional	0.5	0	0	0	0.5
Technical	1	0	0	0	1
Administrative	0	0	0	0	0
Other	0	0	0	0	0
Computed Total	2.0	0.5	0.5	1	4.0

Student Count by Classification of Instructional Programs (CIP) Code

Undergraduate	Graduate	Post-Doctorate	CIP Code
9	11	3	01.11 Plant Sciences.

Target Audience

The audience reached by our efforts during this reporting period included agricultural producers and industries involved in vegetable production, including state, regional, and vegetable grower associations. Other impacted target audience includes consultants, research scientists, graduate and undergraduate students, and K-12 educators.

Accession No. 1031511 **Project No. NMSANOGO-23G**

Products

DR 1020-006 Certification Statement

N/A, this project/program did not produce any scholarly publications and data assets as defined by DR 1020-006 during the reporting period.

Type

Other Journal Articles

Status

Published

Year Published

2026

NIFA Support Acknowledged

YES

Digital Object Identifier (DOI)

Author ORCID(s)

Citation

Anifowoshe, Y., Lozada, D., Sanogo, S., Djaman, K. Water management in chile peppers and plant susceptibility to Phytophthora capsici and development of Phytophthora blight: A review. Agronomy. 2025; 15(12):2819. https://doi.org/10.3390/agronomy15122819.

Babadoost, M. 2026. Effective seed treatment for managing seedling damping-off of pumpkin, caused by Phytophthora capsici. Acta Horticulturae 1453. https://doi.org/10.17660/ActaHortic.2026.1453.9.

Lozada, D.N., Cabrales-Arellano, P., Matres, J.M., Angeles, J.G.C., Velazquez-Martinez, V., Kaur, N., Delgado, E. and Sanogo, S., 2026. Transcriptome profiling reveals tissue-wide gene expression in chili pepper (Capsicum annuum L.) under infection by Phytophthora capsici. Frontiers in Plant Science, 17, p.1745952. https://doi.org/10.3389/fpls.2026.1745952

Redhu, S., and Babadoost, M. 2026. Effectiveness of selected fungicides for manging

Accession No. 1031511 **Project No. NMSANOGO-23G**

Phytophthora blight (Phytophthora capsici) of processing pumpkin in central Illinois, 2025. Plant Health Progress. https://doi.org/10.1094/PHP-12-25-0279-PDMR.

Type

Conference Papers and Presentations

Status

Published

Year Published

2026

NIFA Support Acknowledged

YES

Digital Object Identifier (DOI)

Author ORCID(s)

Citation

Ali, E. 2026. Common diseases of vegetable crops and their management. Invited speaker and presenter, “Pest and Disease,” at the NBFR Session IV: Bugs, Bugs, Bugs – Pest Identification, Pest Management, and Pest Control Workshop, University of Arkansas at Pine Blugg (UAPB), Pine Bluff, Arkansas. June 22-23, 2026.

Ali, E., Chukwuma, F. 2026. Simple steps for detection of Phytophthora capsici. Trifold. Alcorn State University Extension Program. Extension publication.

Ali, E., Waliullah, S. 2026. Deploying portable diagnostic technologies for vegetable disease detection and extension education. American Society for Horticultural Science 2026 Annual Conference, August 3-7, Dallas, Texas. (Abstract and oral presentation)

Ali, E., Waliullah, S. 2026. Deployment of advanced on-site technologies for detection of vegetable diseases and education through contemporary extension programming. The 22nd Biennial Association of 1890 Research Directors (ARD) Research Symposium, March 28-31, 2026, New Orleans, Louisiana. (Abstract and oral presentation)

Ali, E., Waliullah, S., and Chukwuma, F. 2026. Mobile plant clinics: Bringing quick, tech-driven disease diagnosis to your farm. Mississippi Academy of Science Conference, Biloxi, MS, March 18-20. (Abstract and oral presentation)

Babadoost, M. Amish/Mennonite vegetable growers meeting - cucurbits. A twilight meeting was organized by Amish and Mennonite vegetable growers on 11 August 2026 (James Stutzman Farm, 1674 St. HWY 133, Arthur, Illinois).

Babadoost, M. Illinois Specialty Crops – Vegetable Session, 28 January 2026 at Springfield, Illinois. More than 50 growers, industry personnel, and extension educators attended the meeting. I discussed diagnoses and managements of various vegetable diseases, emphasizing Phytophthora blight of cucurbits and peppers.

Babadoost, M. In-service Training of Missouri Agricultural Extension Educators. This meeting was organized by the Lincoln University in Jefferson City in Missouri on 27 April 2026.

Babadoost, M. Northern Illinois vegetable growers meeting. Northern Illinois vegetable growers meeting at Rockford, Illinois (Northern Illinois University, 8500 E. State St., Rockford, IL 61108) on 16 February 2026.

Babadoost, M. Southern Illinois vegetable growers meeting - cucurbits. Southern Illinois vegetable growers meeting at Mt. Vernon, Illinois (Double Tree Hilton, 222 Potomac Blvd, Mt. Vernon, Illinois 62864) on 11 February 2026.

Babadoost, M. Southern Illinois vegetable growers meeting - peppers. Southern Illinois vegetable growers meeting at Mt. Vernon, Illinois (Double Tree Hilton, 222 Potomac Blvd, Mt. Vernon, Illinois 62864) on 11 February 2026.

Babadoost, M. Tenth Edition of Global Congress on Plant Biology and Biotechnology. This meeting was in Singapore during 26-28 March 2026.

Babadoost, M.Illinois Specialty Crops – Pumpkin Session, 30 January 2026 at Springfield, Illinois.

Dufault, N., Paret, M., Fullem, K., Roberts, P., Vallad, G., Da Silva, S. UF agrigator spray program: Watermelon. January 3, 2026. University of Florida IFAS Extension. doi.org/10.32473/edis-pp386-2026.2

Dufault, Nicholas S., Mathews Paret, Kiersten Fullem, Pamela D. Roberts, Gary Vallad, and Susannah Da Silva. 2026. “UF AgriGator Spray Program: Watermelon: PP386, 1 2026”. EDIS 2026 (1). Gainesville, FL. https://doi.org/10.32473/EDIS-PP386-2025.

Elms, R., Crosby, K., Wayne Smith, C., Jifon, J., Isakeit, T. Breeding for Phytophthora capsici resistance and fruit quality in watermelon. Annual Conference of the American Society of Horticultural Science. Dallas, TX. August 2026 (Abstract and oral presentation).

Elms, R., Crosby, K., Wayne Smith, C., Jifon, J., Isakeit, T. Evaluation of watermelon (Citrullus spp.) hybrid populations for resistance to Phytophthora capsici. Annual Meeting of the Southern Region of the American Society of Horticultural Science, Louisville, Kentucky. February 2026 Abstract and oral presentation).

Accession No. 1031511 **Project No. NMSANOGO-23G**

Type
Conference Papers and Presentations

Status
Published

Year Published
2026

NIFA Support Acknowledged
YES

Digital Object Identifier (DOI)

Author ORCID(s)

Citation
Fechner, J. SIPRE overview. Curry Farms Field Day. Pearce, AZ. March 26, 2026.

Fechner, J. Update on multi-state Phytophthora project. New Jersey Ag Convention and Trade Show. January 20-23, 2026. Atlantic City, NJ.

Fechner, J. What does a plant pathologist do? Hatch Valley Middle School Career Day. Hatch, NM. April 29, 2026.

Fechner, J., Sanogo, S. Efficacy of combined biological fungicides and biostimulants against three major chile pepper pathogens. New Mexico Chile Conference. February 2-3, 2026. Las Cruces, NM. (Abstract and poster presentation)

Fechner, J., Sanogo, S. Evaluating the efficacy of combined biological fungicides and mycorrhizal inoculant against soilborne pathogens of chile pepper. American Phytopathological Society Plant Health 2026. August 1-4, 2026. Providence, RI. (Abstract and poster presentation).

Fechner, J., Tellez, I., Dura, S., Lujan, P., Barrazza, J, and Sanogo, S. Biorational management of soilborne pathogens. Leyendecker Research Center Field Day. June 3, 2026. Las Cruces, NM.

Kiersten R. Fullem, Kristin S. Beckham, Anil C. Somenahally, Soum Sanogo, Nicholas S. Dufault. Is Commercial Soil Health Testing A Useful Service for Florida Watermelon Growers Managing Soilborne Pathogens? Abstract/Poster presentation at the 2026 American Phytopathological Society-Southern Division annual meeting.

Lozada, D.N., Cabrales-Arellano, P., Matres, J.M., Angeles, J.G.C., et al. 2026. Transcriptome profiling reveals tissue-wide gene expression in chili pepper (Capsicum annuum L.) under Phytophthora capsici. Frontiers in Plant Science 17 https://doi.org/10.3389/fpls.2026.1745952

Mamo, B. Preliminary findings from Arizona P. capsici isolate collection and fungicide sensitivity. Spring Institute for Phytophthora Research and Extension (SIPRE) and NM Chile Pepper Conference. February 2-3, 2026.

Matres, J.M. Genetic diversity of Phytophthora capsici: Whole genome assembly using HiFi and Hi-C sequencing. Spring Institute for Phytophthora capsici Research and Extension (SIPRE) 2026, Las Cruces, NM.

Matres, J.M., Bailey, D., Sanogo, S., Copetti, D., Mudge, J., Lozada, D.N. Haplotype-resolved assembly of Phytophthora capsici genome using HiFi and Hi-C sequencing. American Society for Horticultural Science (ASHS) Conference 2026, August 3-7, 2026, Dallas, TX (Abstract and oral presentation).

Neupane, P., Fullem, K., Somenahally, A., Dufault, N. Investigate rhizosphere soil microbiome under biological and conventional methods of Phytophthora capsici control in watermelon (var. Troubadour). CANVAS-2026.

Neupane, P., Somenahally, A., Gentry, T., Mowrer, J., Isakeit, T., Coffman, L., Aguilar, C. Implementing organic practices to manage Phytophthora capsici in peppers: Implications on greenhouse gas emissions. Southern American Society of Agronomy. 2025.

Neupane, P., Somenahally, A., Gentry, T., Mowrer, J., Isakeit, T., Coffman, L., Aguilar, C. Evaluating organic practices for greenhouse gas emissions and disease suppression. Tri-Society Conference. 2024.

Accession No. 1031511 **Project No. NMSANOGO-23G**

Type
Conference Papers and Presentations

Status
Published

Year Published
2026

NIFA Support Acknowledged
YES

Digital Object Identifier (DOI)

Author ORCID(s)

Citation

Sanogo, S. 2026. Biorational Approaches for Microbial Balance and Soilborne Disease Management. Presentation at the 2026 conference of Roots of Renewal in Montrose, CO, January 23, 2026.

Sanogo, S. 2026. Introductory remarks, 2026 Spring Institute for Phytophthora Research and Extension (SIPRE). February 2, 2026, Las Cruces, NM.

Sanogo, S. 2026. Strategies for Enhancing Microbial Recruitment and Persistence in Soil for Soilborne Disease Management. Presentation at the 2026 New Mexico Chile Conference, Las Cruces, NM, February 3, 2026.

Sanogo, S. 2026. Mycorrhizae As Ecosystem Service Providers: How Good Is Their Service?" March 10, 2026. Online presentation at the 2026 Southwest Drought Learning Network, Drought in Agriculture Team Webinar series.

Sanogo, S. 2026. Soilborne Disease Research in Chile Pepper. Online presentation at the 2026 Chile Forum of the Institute of Crop Science-University of the Philippines at Los Banos, Philippines March 27, 2026.

Sanogo, S., Belteton, S., Tellez, I., and Fechner, J. 2026. Chile Party Crushers: Can You Say Their Names? Phytophthora, Rhizoctonia, Verticillium. NMSU-ACES 2026 Open House, April 2026.

Sanogo, S., Belteton, S., Tellez, I., and Fechner, J. 2026. Exploring the World of Fungi: The Good, The Bad, and The Ugly?. NMSU-ACES 2026 Open House, April 2026.

Tellez, I., Villegas, K., Tarin, N., Zubiate, C., Almaraz, K., and Sanogo, S. Activity of culture filtrate and macerate from London rocket on germination of chile pepper in soil infested with Phytophthora capsici. Poster presentation at the 2026 Plant Health annual meeting, August 1-4, 2026, Providence, Rhode Island (Abstract and presentation presentation).

Watson, J., Waliullah, S., Ali, E. 2026. Simplifying plant disease diagnosis through the application of immunostrip assays in vegetable crops. Mississippi Academy of Science Conference, Biloxi, MS, March 18-20. (Abstract and oral presentation)

Wyenandt, A. Agri-Technology, Nursery, Fruit and Vegetable Research Twilight Meeting at the Rutgers Agricultural Research and Extension Center near Bridgeton, New Jersey held each August.

Wyenandt, A. Diagnosing important diseases in pepper – Reference Guide, Rutgers Plant and Pest Advisory.

Wyenandt, A. Phytophthora and Pythium control during wet weather. Rutgers Plant and Pest Advisory.

Wyenandt, A. Understanding phenylamide (FRAC group 4) fungicides. Rutgers Plant and Pest Advisory.

Wyenandt, A. Update on disease control in vegetable crops. NorthEast Agricultural Expo and Education 2026, Atlantic City, NJ.

Wyenandt, A. Update on disease control in vegetable crops. South Jersey Vegetable Integrated Crop Management Twilight Meeting held each April at the East Vineland Fire Hall in Vineland, NJ.

Wyenandt, A. Update on disease control in vegetable crops. The Central Jersey Commercial Vegetable Growers Meeting held each February at the Hunterdon County Complex, Flemington, NJ.

Wyenandt, A. Update on disease control in vegetable crops. The North Jersey Commercial Vegetable Growers Meeting held each February at the Monmouth County Agricultural Building in Freehold, NJ.

Accession No. 1031511 **Project No. NMSANOGO-23G**

Type
Theses/Dissertations

Status
Other

Year Published
2026

NIFA Support Acknowledged
YES

Digital Object Identifier (DOI)

Author ORCID(s)

Citation
Anifowoshe, Yusuf. 2026. Irrigation management in chile peppers and plant susceptibility to Phytophthora capsici and development of Phytophthora blight. Master of Science in Water Science and Management.

Khatiwada, Ankita. 2026. A stakeholder-based assessment of knowledge, perception of disease-risk factors, and economic impacts of Phytophthora capsici. Master of Science in Agricultural Economics.

Accession No. 1031511 **Project No. NMSANOGO-23G**

Other Products

Type
Other

DOI or Other Persistent Identifier

Associated Publication DOI(s)

Author ORCID(s)

Description
IN THE NEWS
Don’t Lose Your Crop to Disease Caused by Phytophthora! https://www.facebook.com/nmextension/videos/phytophthora-tips/25670105909345957/

NMSU researcher to lead workshop on plant pathogen
https://newsroom.nmsu.edu/news/nmsu-researcher-to-lead-workshop-on-plant-pathogen/s/f5c2371c-9d52-45ae-b28a-295fba000c80

Changes/Problems
Lack of disease pressure in some fields and greenhouse work has proven difficult. The inability to recover some Phytophthora capsici isolates from plant parts has also been a challenge. Percentage expenditure varied across Co-PIs ranging from 5-100% for Year 3.