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FABIAN GARCIA RESEARCH CENTER

2023 ANNUAL REPORT

THE NMSU AGRICULTURAL EXPERIMENT STATION SUPPORTS RESEARCH THAT ADDRESSES REAL-WORLD PROBLEMS. RESEARCH IS AT THE CORE OF NMSU'S MISSION TO IMPROVE THE LIVES OF PEOPLE GLOBALLY.

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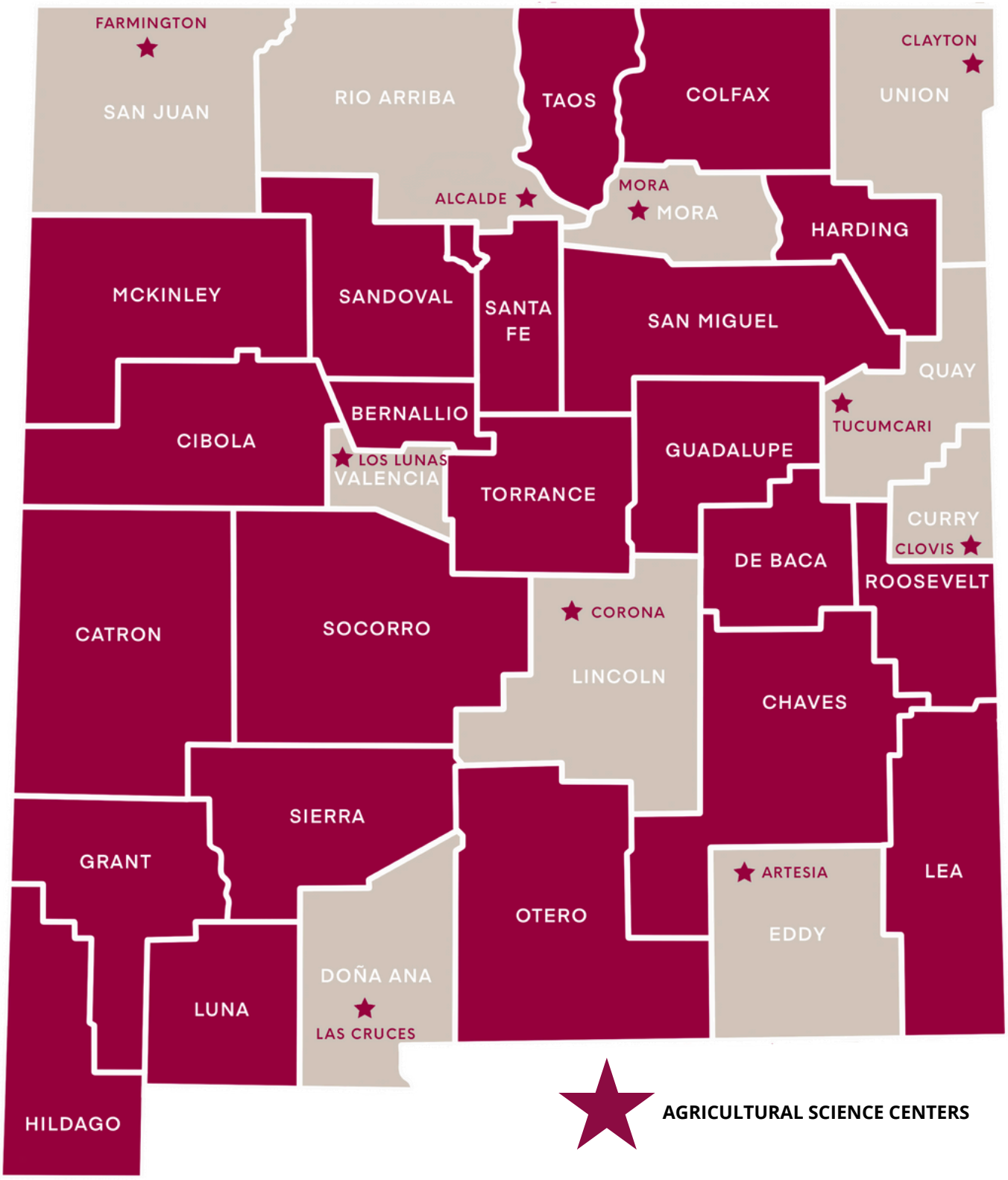
AGRICULTURAL SCIENCE CENTER LOCATIONS MAP



EXECUTIVE SUMMARY

The Fabian Garcia Science Center supports a diverse variety of agricultural research on 47 acres located less than a mile from the NMSU main campus in Las Cruces. The center hosts research on plant breeding, regionally adapted and alternative crops, water-wise cropping, viticulture, algae for biofuel, sustainable agriculture, and best management practices in its research plots and greenhouses. In addition, a student-run greenhouse hosts growing space for clubs, the Floral Team, the Horticulture Forum, and classes such as greenhouse retailing. The botanical garden and gazebo are community favorites for photographs, events, educational tours, and enjoying the seasonal landscape gardens.

Current research at the Fabian Garcia Science Center focuses on plant breeding of drought-resilient varieties of alfalfa, alternative water and drought mitigation resources, onion cultivars resistant to diseases and pests, genetic improvements of chile peppers, maximizing algae biomass for biofuel production, and chile peppers that can be mechanically harvested. Researchers at Fabian Garcia are also looking at ways to make agriculture more environmentally friendly, utilizing regionally adapted cover crop mixtures adapted to hotter and drier climates, and testing alternative, water-wise crops. The Jose Fernandez Garden at the Heritage Farm continues to support vegetable growers in the region through testing of underutilized and heat-tolerant vegetables and demonstrating sustainable management practices like soil solarization and soil building for maximizing health.

RESEARCH HIGHLIGHTS

ONION GENETIC IMPROVEMENT

Investigator: Christopher Cramer (cscramer@nmsu.edu)

PROJECT OVERVIEW

Fusarium basal rot (FBR) is a soil-borne fungal disease that causes a disintegration of the onion bulb killing the entire plant. Onion stakeholders have identified FBR as a severe disease threat to onion yield and economic sustainability. Breeding for host plant resistance to FBR may eliminate the detrimental effects of the disease. Onion germplasm was evaluated for susceptibility to FBR by inoculating onion bulbs with a virulent isolate of the disease-causing pathogen. Onion germplasm was identified as exhibiting a lower disease severity than an FBR-susceptible and an FBR-resistant onion cultivar used in the evaluation. Selection for reduced disease severity proved successful as severity has decreased over successive generations of selection.

MEETING THE NEEDS OF NEW MEXICO

This research demonstrated that the evaluation method was successful in reliably producing disease symptoms which is essential for disease resistance development. Germplasm has been developed that expresses lower disease severity because of selection. Researchers have identified in onion a group of host plant compounds that appear to be involved in conferring resistance to this disease. Selection for these compounds will aid in the development of FBR-resistant onion cultivars. Commercial seed companies can use this information and germplasm to develop FBR-resistant onion cultivars. This will result in improved onion cultivars that growers in New Mexico can use to improve their productivity.

IMPACT

Breeding for reducing Fusarium basal rot disease symptoms when bulbs are artificially inoculated with a virulent isolate of Fusarium oxysporum f. sp. cepae (FOC) has resulted in onion breeding lines that exhibit substantially fewer disease symptoms when bulbs are artificially inoculated with FOC. These breeding lines exhibit significantly less disease than a highly FBR-susceptible onion cultivar and a moderately FBR-resistant onion cultivar that currently exhibits the highest level of FBR resistance in short-day onions.

FUNDING ACKNOWLEDGMENT:

USDA NIFA

REGENERATION OF SHORT-DAY ONION ACCESSIONS

Investigator: Christopher Cramer (cscramer@nmsu.edu)

PROJECT OVERVIEW

Numerous short-day onion plant introduction (PI) accessions maintained at the Plant Genetic Resources Unit (PGRU) of Geneva, NY were in danger of being lost from the U.S. germplasm collection due to sub-standard viability and low seed supply of those accessions. Seed regeneration of short-day onion in Geneva, NY has been difficult because of improper daylengths and environmental conditions. The onion curator at PGRU sent a seed of 20 onion accessions to NMSU for the onion breeding program to produce a new seed of those accessions. The received seed was sown in growing media in the greenhouse before being transplanted to the field. Those plants produced onion bulbs that went into dormancy. Onion bulbs from the previous year's planting flowered in crossing cages. Pollinators were introduced to those cages and seed was produced. Once the seed was cleaned, the seed of 12 PI accessions was sent to the onion curator in August.

MEETING THE NEEDS OF NEW MEXICO

Seed was produced from plant introduction accessions so that this seed can be distributed to onion researchers and breeders throughout the world. Some of these accessions may have important traits or qualities that could have been lost. These accessions could be used by commercial seed companies that develop onion cultivars grown here in New Mexico. These new cultivars will help NM onion growers adapt to changing growing conditions remain economically competitive and remain a viable agricultural industry.

IMPACT

The seed was produced from plant introduction accessions so that this seed can be distributed to onion researchers and breeders throughout the world. Some of these accessions may have important traits or qualities that could have been lost. These efforts help to maintain the viability and effectiveness of the U.S. onion germplasm collection.

REDUCING COSTS AND IMPROVING ENVIRONMENTAL SAFETY OF ONION HERBICIDE PROGRAMS

Investigators: Christopher Cramer (cscramer@nmsu.edu) and Brian Schutte

PROJECT OVERVIEW

Onion weed management programs benefit from residual herbicides applied at crop seeding. Residual herbicides currently registered for application at onion seeding include bensulide and DCPA. Applications of both herbicides are relatively expensive and potentially have high environmental impacts. Pendimethalin is less expensive and has a lower environmental risk than bensulide and DCPA. It is traditionally applied when dry bulb onions have 2 to 9 true leaves. Newer registrations allow for pendimethalin applications after onion germination prior to onion emergence. A post-planting, delayed preemergence application of pendimethalin resulted in similar or better control of annual weeds than current weed control methods using Bensuilde and DCPA herbicides or pendimethalin applied at the 2-leaf stage for autumn-sown onions in New Mexico. This same application of pendimethalin did not impact onion stand and bulb yield while also not leaving any detectable residues on onion bulbs after harvest.

MEETING THE NEEDS OF NEW MEXICO

A post-planting, delayed preemergence application of pendimethalin could provide comparable or better control of annual weeds as currently used herbicides in autumn-sown and winter-sown onions in New Mexico while reducing herbicide costs by 92-95% ($99-$156/acre) and reducing the legacy costs on the environment by 74-88%. This simple switch could save the NM onion industry $1 million per year.

IMPACT

The application of pendimethalin at onion seedling pre-emergence did not have a detrimental effect on onion plant stand, onion marketable bulb yield, or jumbo bulb yield as compared to unsprayed control treatment and currently labeled herbicides for weed control in winter-sown onions grown in New Mexico. Effective weed control in winter-sown onions in New Mexico using a pre-emergence application of pendimethalin could greatly reduce the cost of weed control and reduce the environmental impact when compared to currently-labeled herbicides for onions in New Mexico.

CHARACTERIZATION OF ONION PHENOTYPES EXHIBITING FEWER IRIS YELLOW SPOT (IYS) SYMPTOMS AND RELEASE OF ONION GERMPLASM FOR IYS MITIGATION

Investigator: Christopher Cramer (cscramer@nmsu.edu)

PROJECT OVERVIEW

Onion stakeholders have identified onion thrips and Iris yellow spot virus as the greatest pest and disease threats to onion yield and economic sustainability. The onion industry in the US is valued at farm gate annually at $900-1,000 million. Onion germplasm is being developed and evaluated which is less impacted by onion thrips and Iris yellow spot. When exposed to high onion thrips pressure and conditions conducive for Iris yellow spot disease development, NMSU breeding lines exhibited fewer thrips per plant, a lower disease severity early in the growing season, and greater bulb size at harvest than a commercial cultivar grown under the same conditions.

MEETING THE NEEDS OF NEW MEXICO

Our research demonstrated that our evaluation method was successful in reliably producing disease symptoms which is essential for disease resistance development. Germplasm has been developed that expresses lower disease severity because of selection. Our target audience can use this information and germplasm to develop disease-resistant onion cultivars. Based upon a conducted economic analysis, onion germplasm resistant to onion thrips and/or IYS could increase profits by $1,000 per ha per year when compared with current marketable yields and management practices. Based upon the annual hectarage of onions grown in New Mexico, the promising resistant breeding lines from our program could increase grower profits for the NM onion industry by $2.7 million.

IMPACT

Lower levels of epicuticular leaf wax of onions results in fewer thrips, less thrips feeding, and less Iris yellow spot (IYS) disease symptoms early in the growing season. When plants of NMSU onion breeding lines were challenged with high levels of onion thrips and the potential for developing IYS disease symptoms, they exhibited fewer thrips and less disease symptoms early in the growing season when compared to plants that possess high levels of epicuticular leaf wax. Plants that are less attractive to onion thrips early in the growing season may require fewer insecticide applications throughout the growing season in order to adequately control thrips levels.

REINVIGORATING CHILE PRODUCTION IN NM THROUGH VARIETY DEVELOPMENT, MECHANIZATION AND FLAVOR PROFILING

Investigators: Stephanie Walker (swalker@nmsu.edu), Danise Coon, Israel Joukhadar

PROJECT OVERVIEW

This project will amplify long-term breeding efforts in developing new cultivars and germplasm emphasizing mechanization and other traits critical for New Mexico's chile crops. Breeding priorities will continue in all the major NM chile pepper crops. Replicated mechanical harvest trials will continue for the evaluation of NM-type green chile breeding lines developed for harvest efficiency. New breeding lines developed from the best of these lines that have been introgressed with novel easy destemming traits provided by germplasm from researchers at UC Davis will be pursued, with the end goal of mechanically harvested destemmed green fruit with the pedicel remaining attached to the plant. Also, with the procurement of a new gas chromatograph equipped to measure flavor volatiles, NM-type chile flavor will be characterized, and advanced breeding lines will be analytically tested to ensure that flavor profiles are aligned with the preferred NM-type green chile flavor that brings fame to our signature crop. NM-type red chile and paprika breeding lines will be further developed emphasizing high levels of pigmentation (ASTA), high dry yield, desired heat level, and preferred smooth-drying characteristics. In addition to more efficient dehydration, these smooth-drying breeding lines will provide useful 'red after green' niche cultivars. Finally, efforts will continue to develop open-pollinated cayenne cultivars and germplasm that provide yield, heat, and soluble solids equivalent to or greater than that of the current standard hybrid cultivars. Initial efforts at breeding mechanical harvest-efficient cayenne cultivars will be continued.

MEETING THE NEEDS OF NEW MEXICO

New Mexico's chile crops are widely renowned for flavor and quality, but acreage in the state is well below the peak seen in the mid-1990s. A key reason for decreased New Mexican chile acreage is the lack of and expense of hand labor. Development of new cultivars and germplasm that are efficient for mechanical harvest, provide increased yield, and possess improved qualities prized by growers, processors, and consumers will put New Mexico's chile crops on a more competitive path with other producing countries and ensure the long-term strength of the industry in the state. The flavor is a key quality parameter that is overwhelmingly cited as the reason for NM-type chile's popularity; however, NMSU lacks the equipment needed to measure and describe the unique volatile compounds that taken together account for NM-type chile flavor. Evaluation of breeding lines has relied on taste tasting, an imprecise method to ensure that breeding lines with new genetics maintain the critical, favored flavor profile. Through the purchase of a gas chromatograph–mass spectrometer equipped with a 'sniff port' (GC-MS-O) breeding efforts will be enhanced and NM-type chile flavor will be categorized. Research findings will be critical to publicizing and protecting local production of NM-type chile. Describing and publicizing the unique flavor and quality of NM-type chile will increase demand for the product, and implementing mechanization will allow NM growers to keep up with demand even with continuing labor challenges.

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REINVIGORATING CHILE PRODUCTION IN NM THROUGH VARIETY DEVELOPMENT, MECHANIZATION AND FLAVOR PROFILING

Investigators: Stephanie Walker (swalker@nmsu.edu), Danise Coon, Israel Joukhadar

IMPACT

Currently, New Mexico growers are dealing with continued labor shortages, adverse growing conditions, water demand, and expensive seed. Describing and publicizing all of the improved qualities and the unique flavor of open-pollinated NM-type chile will increase demand for the product, and implementing mechanization will allow NM growers to keep up with demand even with continuing labor challenges.

OPTIMIZING SELECTION PRESSURES AND PEST MANAGEMENT TO MAXIMIZE ALGAL BIOMASS YIELD

Investigator: Alina Corcoran (acor@nmsu.edu), New Mexico Consortium/NMSU

PROJECT OVERVIEW

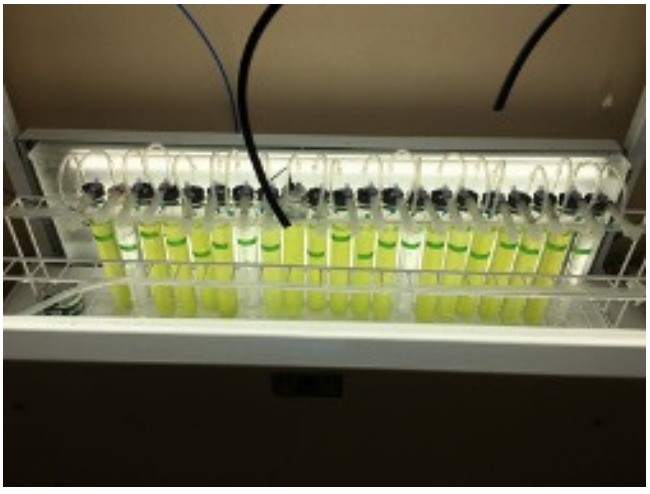
This project addresses the urgent industry need to enhance the productivity, stability, and quality of algal strains for biofuels. By focusing on outdoor cultivation, the goal is a 50% improvement in harvest yield and robustness, along with a 20% increase in conversion yield. The project's components include balancing indoor and outdoor selection pressures, optimizing pest management, and improving field strain performance. Through year-round cultivation at different sites, the project aims to naturally develop robust cultivars with varied environmental tolerances. Metagenomic tools will be used for pest management, and non-GM approaches will enhance the baseline field-adapted strain, tested at New Mexico State University's outdoor testbed. The approach is unique, leveraging natural selection pressures in industry-standard strains.

MEETING THE NEEDS OF NEW MEXICO

The recent listing of algae as a commodity opens opportunities for algae farmers across the US, including NM. NM is home to the largest algae cultivation facility in the US. Federal agencies including the DOE, USDA, NOAA, and NSF are working together to strategically fund R&D in complementary areas across basic biology, crop development, and systems integration to increase yield and use in sustainable systems. New Mexico benefits from these funding opportunities, with flow-through and competitive funding to Los Alamos National Laboratory, Sandia National Laboratory, UNM, and NMSU for algae R&D, and to Santa Fe Community College for workforce development through the Algae Technology Education Consortium (ATEC). Advancements in this work will establish NM and NMSU as a hub for algae-based R&D and commercialization.

IMPACT

The project will result in the Quantification of algal trait evolution in response to environmental drivers. Isolation of robust cultivars developed under outdoor selection pressures. Improvement of field-collected strains through laboratory selection pipelines. Data-informed optimization of SOPs for laboratory maintenance, scaling, and seeding. Development and dissemination of best practices for real-time, adaptive pest. TEA and LCA assessment incorporating the above-mentioned strategies.



GENETIC IMPROVEMENT OF ALFALFA GERMPLASM FOR NEW MEXICO

Investigators: Christopher Pierce (cpierce@nmsu.edu) and Dr. Ian Ray (retired August 2023)

PROJECT OVERVIEW

In the fall of 2023, the development of three new improved alfalfa populations started by transplanting approximately 150 surviving alfalfa plants from pest resistance screenings conducted by Crop Characteristics. Transplants are maintained within a greenhouse at Fabian Garcia Agricultural Science Center. These transplants will be crossed with plants selected, from their derived populations, within the 2019 Alfalfa Variety Field Trials (Leyendecker PSRC). Improved alfalfa populations will be produced by crossing field-dug alfalfa plants with pest-screened alfalfa plants. Seed will be harvested and stored for future field trial testing. The goal is to increase each population's pest resistance while maintaining the good biomass production and quality characteristics of the original populations.

MEETING THE NEEDS OF NEW MEXICO

Field evaluations for alfalfa forage yield production, conducted at Leyendecker PSRC, completed their fourth and final production year in the fall of 2023. From these trials, three NMSU-developed alfalfa populations are pending variety release with final approval expected early in 2024. Alfalfa plants, representing these populations, are in the process of being screened for resistance to several diseases and pests. This project further enhances alfalfa variety development, ensuring that New Mexico alfalfa farmers continue to have varieties with good forage quality and high forage biomass production for their farming operations.

IMPACT

Limited water resources threaten New Mexico's $172 million alfalfa industry. Alfalfa variety trials conducted throughout New Mexico, have demonstrated that several alfalfa populations, developed at New Mexico State University, have great resilience to drought and can produce high biomass yield under well-watered conditions. Further enhancement of these populations' disease resistance and persistence will ensure that New Mexico alfalfa growers continue to have alfalfa varieties that produce good biomass yield under highly variable soil moisture conditions.

ALTERNATIVE CROPS, CROPPING SYSTEMS, AND NEW CROP PESTS FOR NEW MEXICO DROUGHT CONDITIONS

Investigators: Geno Picchioni (gpicchio@nmsu.edu), S. Angadi, M. Darapuneni, K. Grover, I. Guzman, S. Hanson, R. Heyduck, A. Mesbach, C. Robbins, S. Salmasi, S. Sanogo, M. Shukla, S. Yao

PROJECT OVERVIEW

In the southwestern U.S., water scarcity has been exacerbated by the current megadrought of over 20 years. If agriculture is to sustain itself in the southwest, it must become water-resilient by developing i) alternative saline water sources, ii) cropping systems that mitigate drought, iii) alternative crops that show potential for drought, heat, and salt tolerance, and iv) increased knowledge of the crop pests that accompany new crops and cropping methods.

MEETING THE NEEDS OF NEW MEXICO

The findings will benefit New Mexico and the southwestern region in the following ways: i) increased drought-resilient crop selection options, ii) lower desalination costs, iii) improved public perception of irrigated agriculture, iv) strengthening of the scientific database relevant to semiarid agriculture, and v) refinement of plant science curricula.

IMPACT

- Up to 30% more brackish groundwater could be available for halophyte irrigation.
- Findings might reduce reliance on guar imports.
- Alternate cropping systems may reduce the risk of crop failures.
- Crop diversity will reduce pest management costs and water and nutrient waste.
- Results will reveal how drought stress affects the quality of medicinal herbs in the southwest and the potential economic impact of organic saffron corms for growers.
- Results will support year-round jujube dried fruit availability.
- Results will provide indicators for developing alternative crops that are tolerant to drought, salinity, and soilborne pathogens.

ONE HUNDRED YEARS OF CHILE PEPPER BREEDING IN NEW MEXICO: GENETIC IMPROVEMENTS AND RELATED CHANGES

Investigators: Dennis N. Lozada (dlozada@nmsu.edu), Seyed Shahabeddin Nourkbakshs, Ehtisham Khokhar, Muhammad Ibrar Khan

PROJECT OVERVIEW

Chile peppers are a major cultural and economic crop in New Mexico. This study examines the genetic improvement and associated changes after 100 years of selection, breeding, and cultivar development at NMSU. Twenty New Mexican pod-type chile peppers released from 1913 to 2021 were examined under replicated trials in FGSC and LPSRC. Results will be beneficial for breeding and selection decisions for chile pepper yield improvement in New Mexico.

MEETING THE NEEDS OF NEW MEXICO

Improvement of yield and productivity is a major focus of the NMSU Chile Pepper Breeding program as it has a direct impact on growers and producers. This project highlighted the efforts to improve this trait for more than 100 years of breeding and selection in the program. Information from this study will be a basis for future research related not only to the improvement of yield and related traits, but also to other traits relevant to the New Mexico Chile Pepper industry such as resistance to different stresses, fruit flavor and quality, and mechanical harvestability.

IMPACT

This study provides relevant information on the selection, breeding, and cultivar development efforts of the NMSU Chile Pepper Breeding and Genetics Program, regarded to be the longest continuous program for the improvement of Capsicum spp. in the world, in the past 100 years. Results will help direct relevant research efforts towards cultivar improvement for key traits related to yield and yield potential, resistance to diseases, fruit flavor, and quality, and machine harvestability.

DEVELOPING AN ELECTRIC MULCH SYSTEM IN VINEYARDS AND BLUEBERRY PRODUCTION

Investigators: Dr. Erik A. Lehnhoff (lehnhoff@nmsu.edu) - New Mexico State University, Dr. Marcelo Moretti (PI) – Oregon State University, Dr. William Gill Giese (PI) – Arkansas State University, Dr. Leslie Beck (PI) - New Mexico State University and Maryel Lopez (Co-PI) - New Mexico State University

PROJECT OVERVIEW

Researchers tested whether electric mulch (i.e., metal screen charged with low-power electricity) could effectively control weeds compared to pre-emergent herbicide and plastic weed barrier.

MEETING THE NEEDS OF NEW MEXICO

Weed management is a main concern that New Mexico grape growers face when it comes to maintaining a healthy vineyard. Tilling has been a standardized practice to decrease the abundance of weeds. However, it introduces risks of nematode and disease spread across the vineyard. Manual weeding results in greater cost and economic investment from these growers, as well as time-consuming. Located in the American Southwest, New Mexico's weather and sunlight allow researchers to study a sustainable weed management procedure using solar panel-powered screens that if efficient will protect soil health and lower the cost, labor, and time commitment of NM's vineyard owners.

IMPACT

The system was installed in April 2023. Researchers performed a randomized complete block study with 5 levels of treatment and 4 replications of each. The electrified screens were powered by 5W solar panels. Each panel had a boost converted to boost the voltage to 300V. The amperage was kept below 10milliamos to keep the system safe from wildlife and the vines. Weed percentage cover data has been collected weekly from the end of vine dormancy through harvest in early September. As partial results, both the plastic mulch and the metal screens show better control over the weeds than the application of herbicide or untreated soil. The electric mulch systems provided very promising results and we will focus on furthering our research to determine how large an area can be treated with a single solar panel.

NATIVE HABITAT ENHANCEMENT FOR IPM IN NEW MEXICO VINEYARDS

Investigators: Maryel Lopez (maryel16@nmsu.edu) - New Mexico State University and William Gill Giese (Co-PI)- Arkansas State University

PROJECT OVERVIEW

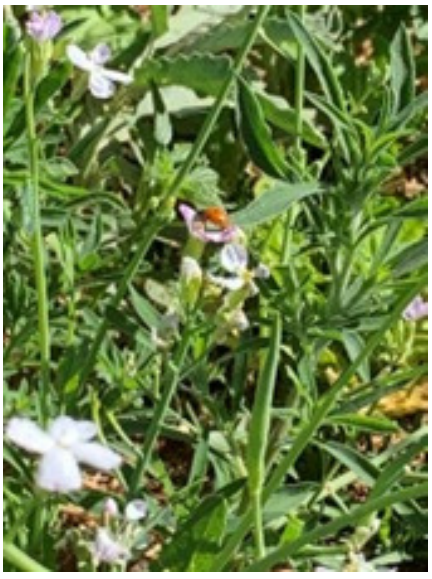
This study focuses on the effectiveness of cover crops in different aspects of vineyard management including optimization of vine growth and performance, pest management, pollinator conservation, soil health and microbiology, and reduction of soil erosion. Several native plant species that thrive in the Southwest will be used as cover crops. The objective is to provide sustainable methods to reduce the need for pesticides for weed and pest control and increase the native habitat to encourage stewardship of natural resources.

MEETING THE NEEDS OF NEW MEXICO

Several farmers and ag professionals have been made aware of methods to achieve possible benefits of cover cropping vineyard row middles in harsh, also of the native pollinators that provide enhancement to the on-farm environment. New Mexico growers describe that maintenance of cover crops is more cost-efficient than tilling, benefits against nematode and pest spread in the vineyard soil and canopy, decreases erosion, and improves soil moisture retention and soil structure for labor.

IMPACT

Demonstration plots at experimental and commercial vineyards have been planted. Experimental vineyards at NMSU Agricultural Science Centers include Los Lunas (1 ac) and Fabian Garcia Agriculture Science Center (4 ac). Commercial vineyards include Pueblo of Santa Ana vineyard, (2 acre), Lescombes vineyard (2 acres), and Amaro winery vineyards (10 acres). Native species is one of the best cover crops to use since it does not need a major investment in irrigation, mowing, and its growth does not affect the development of the vines. However, both flowering as well as native species are seeded to evaluate their effectiveness and benefits to the vineyard environment. To increase knowledge and awareness of the benefits of cover crops in vineyards in the Southwest, an online webinar-based training course on “Cover Crops to Enhance Native Pollinators and Manage Insect Pests of Vineyards and Orchards” will be created. It will be incorporated into existing Pesticide Applicator Training.



COTTON BREEDING

Investigator: Jinfa Zhang (jinzhang@nmsu.edu)

PROJECT OVERVIEW

Cotton is the world's leading fiber crop, and high-quality fibers command high cotton prices. In addition, cottonseed also produces 14-19% of farm-gate value from cotton production. Elevating cotton to a more important food crop for human consumption through improving seed oil content and quality can significantly increase the net income for cotton producers and cottonseed processors. The cotton breeding program seeks to develop cotton cultivars and elite lines with high yields, premium fiber quality, enhanced cottonseed oil and fatty acids, and resistance to biotic and abiotic stresses through conventional and introgression genetics and breeding approaches. Genetic and genomic tools are being used to identify genes responsible for desirable traits used in breeding.

MEETING THE NEEDS OF NEW MEXICO

New Mexico's cotton production brings significant economic value to the agricultural industry. Many producers and farm workers are dependent on cotton production. During the biotechnology age when more than 97% of the U.S. cotton acreage is grown to genetically modified (GM) cotton, New Mexico farmers, including organic cotton producers, are still growing NMSU-bred non-GM cotton varieties. Therefore, developing non-GM cotton varieties with high lint yield, premium fiber quality, stress tolerance, and added values from cottonseeds for NM cotton producers is important to NM agriculture.

IMPACT

New Mexico planted 66,000 acres of Upland cotton and produced 993 pounds of cotton lint per acre in 2022. The current cotton price stands at $0.87 per pound. When a new high-yielding cotton cultivar increases yield by 10%, NM cotton growers can increase their productivity by 100 pounds per acre with no additional production cost. When 20% of the cotton acreage is grown to the new cultivar, New Mexico cotton growers will increase net income by $11.5 million. Cottonseed with high cottonseed oil quantity and quality will further increase their production revenues. Cotton with resistance to abiotic and biotic stresses will reduce production cost and loss from insects, diseases, and drought stress.

GUAR RESEARCH

Investigator: Kulbhushan Grover (kgrover@nmsu.edu)

PROJECT OVERVIEW

The goal of the research is to evaluate the growth and performance of guar and its agronomic management. A collaboration between NMSU and the US salinity lab looks at salt tolerance in guar genotypes in Lysimeter studies. These genotypes were evaluated for their field performance at Fabian Garcia Science Center.

MEETING THE NEEDS OF NEW MEXICO

Guar is a drought-tolerant crop that can provide an alternative option for local growers in the region. It can be grown for seed to produce guar gum; as a legume forage; or for fresh green beans.

IMPACT

Region-specific information generated through the research at NMSU will result in better awareness and interest in growing guar in New Mexico.

BY THE NUMBERS

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GRANTS AND CONTRACTS

Christopher Cramer

- Regeneration of short-day onions, National Plant Germplasm System, ARS, USDA, $126,376 (2019-2024).
- NMDA Specialty Crop Block Grant Program, $62,843 (2021-2024
- Characterization of onion phenotypes exhibiting fewer Iris yellow spot (IYS) symptoms and release of onion germplasm for IYS mitigation, Washington State Univ., $543,555 (2018-2023)

Stephanie Walker

- ChIP - 2 yr total: $ 476,000

Viticulture

- WSSA Innovative Grants provided $50,000.00

Alina Cocoran

- 7 subcontracts, from 100% cost share ($0 Federal) to $1M federal + 20% cost share

Kulbhashan Grover

- Broadening Agricultural Science Education: A FL-TX-NM Consortium, NIFA, $292,000.

OUTREACH ACTIVITIES

- Fabian Garcia Science Center Field Day
- Onion Day
- Navajo Nation Delegation
- Chile Pepper Institute Teaching Garden
- Hosted several high school groups, including Espanola High upward bound and Santa Theresa High film team
- La Semilla Farmer Fellow cohort training
- State 4-H Conference
- Hosted PBS for an episode of Hungry Planet
- Dona Ana County and Southern New Mexico State Fair meetings

PEOPLE


Agricultural Experiment Station
NM STATE UNIVERSITY


NM STATE

COOPERATORS AND COLLABORATORS

- Israel Joukhader
- Danise Coon
- Brian Schutte
- Christopher Pierce
- Sangu Angadi
- Murali Darapuneni
- Kulbhushan Grover
- Ivette Guzman
- Steve Hanson
- Robert Heyduck
- Abdel Mesbach
- Chanz Robbins
- Said Salmasi
- Soum Sanogo
- Manoj Shukla
- Shengrui Yao
- Shahab Nourkbakshs
- Ehtisham Khokhar
- Muhammad Ibrar Khan
- Maryel Lopez
- Leslie Beck
- William Giese
- M. Moretti
- Erik Lehnhoff

OTHER UNIVERSITY

- Colorado State University (Fort Collins, CO)
- University of Arizona
- University of California San Diego (San Diego, CA)
- Texas A&M University
- Utah State University
- Michigan State University
- UC Davis
- Oregon State University
- Arkansas State University

COOPERATORS AND COLLABORATORS

STATE

- Los Alamos National Laboratory (Los Alamos, NM)
- New Mexico-WRRI

FEDERAL

- Rebecca Povilus, USDA Onion Curator, Geneva, NY
- USDA-ARS, Southwestern Cotton Ginning Lab
- USDA-ARS, Crop Genetics Unit
- USDA/ARS, Riverside CA
- BASF
- USBR-BGNDRF

INDUSTRY

- Multiple Alfalfa Seed Companies.
- NM Hay Association
- Cyanotech Corporation (Kailua-Kona, HI)
- Phase Genomics, Inc. (Seattle, WA)
- Qualitas Health, Inc. (Imperial, TX)
- New Mexico Chile Association
- El Paso Water
- Ward Laboratories
- Los Poblanos Historic Inn and Organic Farm
- High Desert Jujube Coop
- Gillis Farms
- Paul Neher- Retired Electrical Engineer
- Cotton Inc.

ASC PERSONNEL

DAVE LOWRY

Program Operations Director

DANISE COON

Research Coordinator

ANTHONY ARANDA

Farm Ranch Manager

DAWSON MOON

Assistant Farm Manager

AUTUMN MARTINEZ

Administrative Assistant

LIBERATO VALDES

Senior Laborer

FLORENCIO FLORES

Laborer