2024
ANNUAL REPORT

CLOVIS AGRICULTURAL SCIENCE CENTER

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College of Agricultural, Consumer and Environmental Sciences
Agricultural Experiment Station

Agricultural Science Center at Clovis

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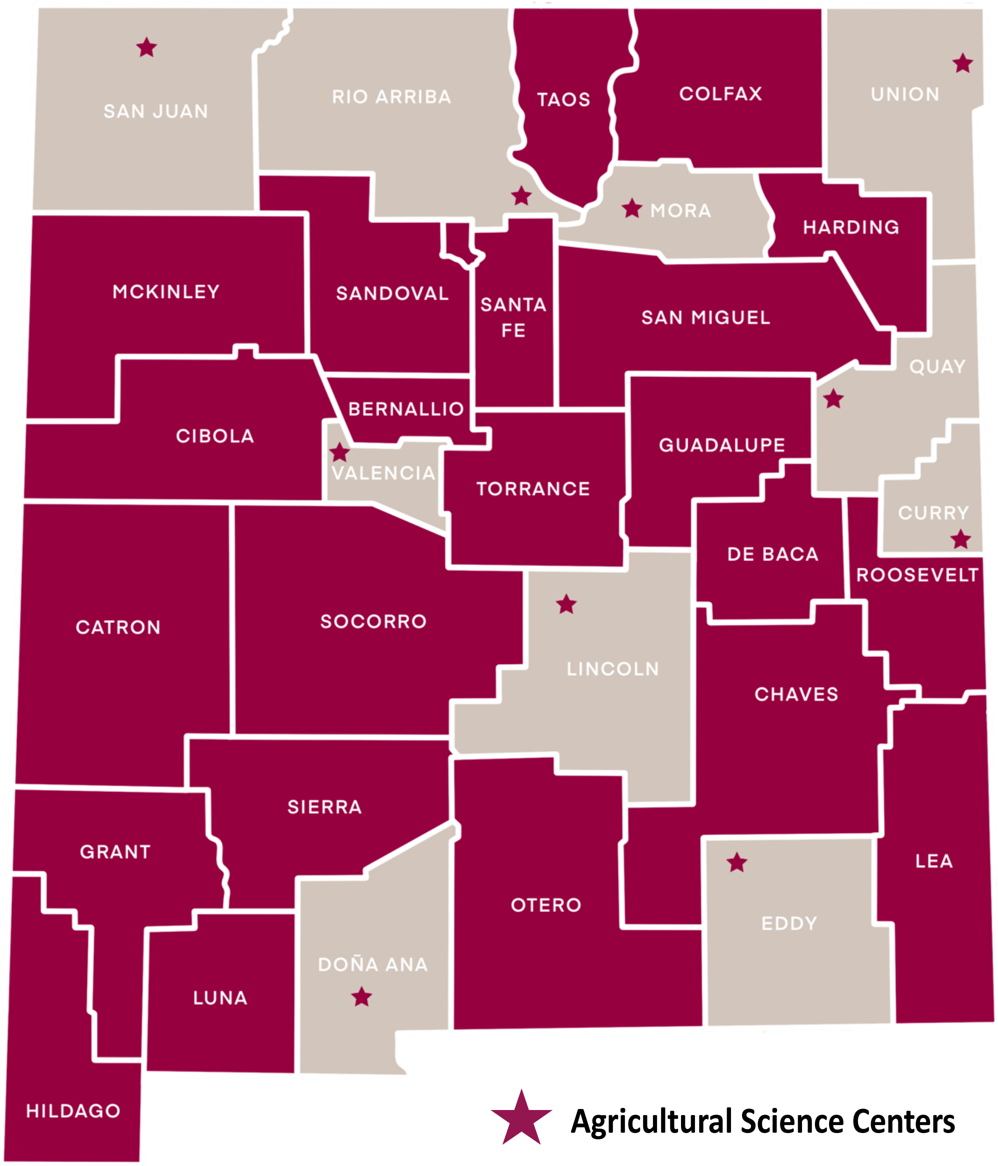
Agricultural Science Center Locations Map



Executive Summary

The NMSU Agricultural Science Center at Clovis is centrally located in the largest crop production area of New Mexico and is uniquely qualified to conduct agricultural research and producer outreach (Extension) activities aimed at efficiently managing the area's limited water resources and increasing the economic viability and sustainability of agricultural production. The water management, soil health, and carbon management programs are some of the most productive research programs at NMSU. These research programs focus on improving the efficiency and profitability of agricultural systems and environmental quality by advancing our understanding of soil biogeochemical cycling, soil and environmental health, and sustainable crop production practices. Other research conducted at the Center includes weed management in corn, sorghum, and winter wheat as well as cotton variety trials. Peanut breeding research is conducted outside the Center at farmers' fields.

Research Highlights

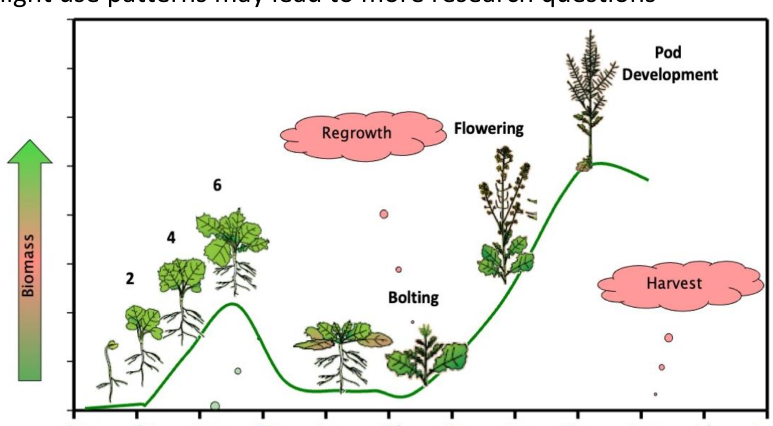
Sunlight Interception and Albedo in Diverse Winter Canola Cultivars During Different Growth and Developmental Stages

Investigators: Sangu Angadi (angadis@nmsu.edu), Guru Yadahalli, Dinesh Kumar, Harjot Sidhu and Mike Stamm (KSU)

Project Overview: In general terms, agriculture is the conversion of sunlight into food using water, air (CO2) and other inputs through the process of photosynthesis. This is essential for feeding almost all living entities on the earth directly or indirectly. Despite this, the radiation use efficiency of most agricultural crops is less than 5%. There are indications that by moving away from perennial grass tree systems to annual cropping systems, we might have reduced solar radiation interception and use efficiency. The sunlight not used by the main crop can negatively affect production agriculture. Winter canola has unique growth and development stages, in the fall it is a mat of thick green leaves, in the winter most green leaves are gradually killed by freezing temperatures, in early spring regrowth and flowering produces a mat of yellow flowers, and early in summer the crop changes into a mat of green pods. How these changes in growth and developmental stages affect its radiation use patterns is unknown. Also, light interception or albedo by flowers and pods may affect its photosynthesis and productivity. A better understanding of this may help with other input management practices. Open-pollinated and hybrid winter canola cultivars were grown at three plant populations and line quantum sensors were installed at three heights in each treatment in one replication to continuously monitor incoming, whole plant interception and flower/pod interception of solar radiation. In addition, albedo sensors were installed in select treatments. All sensors were logged using Campbell data loggers to monitor diurnal and seasonal patterns of sunlight dynamics in the winter canola crop.

Meeting the Needs of New Mexico: This project will address the basic understanding of radiation use of a new crop of winter canola. This knowledge will help NM producers in three ways. First, developing a new alternative crop that can help protect their natural resources like soil and water. Secondly, understanding seasonal as well as plant organs' (e.g. leaf, flower and pod) radiation use efficiencies may assist in managing other inputs like nutrients and water. For example, if a growth stage is least efficient in using radiation (inefficient photosynthesis). Then, can we reduce irrigation during that stage without affecting yield? Thirdly, can we use management like suitable cultivars or plant populations to improve radiation use efficiency? Also, understanding light use patterns may lead to more research questions that can help NM agriculture.

Impacts: This is the first year of study and it needs to continue for multiple seasons. A large quantity of data has been generated, and processing that data will take some time. Already, the project has generated lots of interest among the research community. This unique way of using line quantum sensors to assess radiation use by plant organs was appreciated by the manufacturing company and the well-known plant physiologist. Potential impacts can be at multiple levels.



A typical seasonal growth pattern of winter canola at Clovis, NM.

Development of Winter Canola for Southern Great Plains

Investigators: Sangu Angadi (angadis@nmsu.edu), Guru Yadahalli, Dinesh Kumar, and Mike Stamm (KSU)

Project Overview: Agriculture in Eastern New Mexico has very few crop choices. High water and input-requiring cereals dominate cropping systems, which has resulted in many problems, including degradation of soil and water resources, weed problems, etc. Crop diversification can address many challenges faced by annual agriculture. Winter canola, which can be used as a source of fodder, edible oil, and protein-rich meal, is a potential crop for the region. It can correct the monocot weed problems that we have created with extensive cereal-based monocropping in the region. It is a tap-rooted broad-leaf crop that has herbicide tolerance technologies incorporated into it. Winter canola is relatively new in the U.S. More recently, with the involvement of European companies, canola hybrids are being introduced into the country. Therefore, research is being conducted with USDA-NIFA funding to evaluate currently available public and private open-pollinated and hybrid winter canola cultivars suitable for the southern Great Plains. This year, new funding was received from USDA-NIFA to assist Kansas State University's breeding program to develop hybrids for the region. In addition, researchers are working on crop management practices to improve the adaptability of the crops in the region.

Meeting the Needs of New Mexico: Developing winter canola will have many benefits to the crop and cattle industry in New Mexico. It is a good source of protein supplement and a forage crop for our large cattle population. As a rotational crop, it will improve resource use efficiency. In addition to edible oil, the seed meal is a highly sought-after supplement for the cattle industry in the state and is currently imported from Canada. It is also a low-water-using, low-input crop that can sustain the Ogallala Aquifer longer.

Impacts: Canola is a low-input, rotational crop that can play a major role in controlling grassy weeds in winter wheat-based rotations. This is a long-term project and developing winter canola as a crop choice will take time, and developing new cultivars will continue as long as the crop is grown in the region. Successful development of well-suited hybrids will improve the productivity and profitability of the crop. The cattle industry in the region needs protein, and growing canola will produce protein supplement from seed meal locally for our large cattle industry, alleviating the need to import it. It also has the potential to produce biodiesel that could run farm vehicles to help the environment and save money. It will also add a deep-rooted, low water-using, broad-leaf crop to crop choices that has many benefits.

A group of researchers from National Labs visiting winter canola research at Clovis, NM.

Effect of Biochar Application Rates on Winter Canola Growth, Yield and Soil Quality Under Controlled Environment Conditions

Investigators: Sangu Angadi (angadis@nmsu.edu), John Idowu, and Murali Darapuneni

Collaborating Agricultural Science Center: Leyendecker Plant Science Center

Project Overview: Declining water resources and uncertain climatic conditions have increased the challenges of growing annual crops in stress-prone Southern Great Plains (SGP). Regenerative technologies can be used to improve the sustainability of the production of conventional and alternative crops in the region. Biochar, a type of charcoal made from organic material, has the potential to improve soil health and water and nutrient availability to support crop growth. Researchers are developing winter canola as a low-input, multiple use alternative crop for the region, where winter wheat is the only option. Understanding the beneficial effects of biochar on winter canola grown in two diverse soil types will help in improving the adaptability of the crop.

Meeting the Needs of New Mexico: Loss of ecosystem services and degradation of soil and water resources is a significant threat to annual production systems in New Mexico. Winter and early spring are the most vulnerable times for environmental degradation and winter wheat is the only crop suitable for protecting soil during that time. A multistate research team is developing winter canola as a potential alternative crop for the region. Winter canola is mainly grown for seed oil, which can be used for human use or for biofuel, while the left-over seed meal is a nutrition supplement for animals. Winter crop rotation with winter canola has multiple benefits including weed control, reduced inputs, and other rotational benefits. Understanding the biochar effect in the two predominant soil types of New Mexico will develop a management tool for producers to protect their natural resources and produce a crop that is economically valuable for the state.

Impacts: Preliminary assessment of the results suggests winter canola responds to biochar application, but soil type plays a major role in that response. Winter canola growth, biomass yield and water efficiency improved more with five levels of biochar application in sandy loam soil compared to clay loam soil. Winter canola growth and yield of winter canola was much higher in clay soil compared to sandy soil. However, biochar did not affect canola growth in clay loam, suggesting water holding ability may have some role in it. This preliminary study was very useful in suggesting an in-depth study using multiple canola open-pollinated cultivars and hybrids grown in diverse soil types to develop recommendations on biochar.

Circular Buffer Strips (CBS) of Native Perennial Grasses to Improve Ecosystem Services in a Center Pivot

Investigators: Sangu Angadi (angadis@nmsu.edu), Rajan Ghimire, John Idowu, Ram Acharya, Prakriti Bista, Sundar Sapkota, Mickie Wilkinson, Guru Yadahalli, and John Holman (KSU), Susannah Tringe, Trent Northen (Berkley National Lab) and Sanna Sevanto, Taraka Dale (Los Alamos National Lab)

Project Overview: Irrigated agriculture in the Southern High Plains (SHP) of the United States is threatened by the declining Ogallala Aquifer (OA) and increasing variability in rainfall and temperature. Due to decreased well outputs, using a portion of the pivot circle for dryland or very limited irrigation production is becoming more common in the region. The region is also facing the loss of many ecosystem services. A novel concept of reintroducing native perennial grasses as circles of buffer strips alternating with crop strips is being evaluated in the project with USDA-NIFA funding to improve water cycle efficiency, productivity, soil health, and many other ecosystem services. This is a long-term project and assessment will be from interdisciplinary teams. During the year, two major sources of funding were secured to support this research. The first is led by Lawrence Berkeley National Laboratory (LBNL) and is focused on assessing the benefits of reintroducing native perennial grasses using genomics, metabolomics, and other sophisticated tools. The second effort is led by Texas A&M University and is focused on extending the benefits to another major crop of the region, cotton.

Meeting the Needs of New Mexico: The project attempts to address major challenges faced by irrigated agriculture in New Mexico and surrounding states, which include declining water resources, increasing climatic variability, strong winds, loss of natural resources, deteriorating soil health, sequestering carbon, and biodiversity. The system is expected to improve water cycle efficiency by improving the conservation of precipitation as well as the efficiency of using it. It is also expected to improve crop microclimate, reduce crop stress, increase productivity, soil health, biodiversity, and climate resiliency, and reduce greenhouse gas emissions. In addition, it offers a few management benefits for farmers including well-pressure management and ease of center pivot maintenance.

Impacts: This is the first project to assess circular buffer strips of native perennial grasses. Microclimate improvements with grass buffer strips were affected by distance, growth stage of the annual crop, and buffer growth. Stress experienced by the crop was reduced with buffers. The benefit of grass strips on reducing soil erosion was influenced by the management of upstream fields, roads, etc. Conservation of high-intensity rainfall with corn grown in circular buffer strips improved by 91 to 139% over the control in two years of observation. Increased ponding, reduced runoff and improved soil health might have contributed to the improvement in rainfall conservation. The conserved water was used with 50 to 63% higher efficiency in corn adjacent to circular buffer strips. Soil health and greenhouse emissions also showed the beneficial impact of circular buffer strips. Grass strips had 24 to 53% lower N2O and 37 to 51% lower CO2-C emissions compared to adjacent corn fields. Grass strips maintained Soil Organic Matter without water and nutrient inputs. Similarly, soil profile C sequestration improved with the integration of perennial grass strips into center-pivot irrigated agriculture. Soil aggregation also indicated that corn grown with buffer strips had a lower erodible fraction (<0.25 mm) of soil aggregates compared to corn grown without any buffers. Biodiversity, both above-ground native pollinator bees and below-ground microbial diversity showed benefits with native perennial grasses in the system. However, benefits in corn strips with buffer were moderate. These observations have a significant impact in the region, where the fraction of rainfall received as high-intensity rain events is increasing and annual agricultural land is typically unable to conserve that water. Although combine harvested corn yield increased most of the years (4 to 20%), the benefit depends on the growing season and grass growth.

A team of National labs collaborators and Dr. Ghimire's collaborators from Ireland, UK, Delaware, and Auburn visiting Circular Buffer Strips trial.

Performance of Advanced Breeding Lines of Valencia Peanut

Investigators: Naveen Puppala (npuppala@nmsu.edu) and Manisha Ojha

Project Overview: Valencia peanut contributes less than 1% of the U.S. production and is mainly grown in eastern New Mexico and western Texas. This project involves the development of Valencia peanuts with desirable characteristics such as flavor, seed size, and pod structures, aiming for high oleic content to improve oil stability and shelf life, high yield, and disease resistance to pod rot and stem rot. The selection of varieties is made based on traditional breeding, such as phenotypic screening, biochemical analysis, and agronomic traits, along with modern technologies like market-assisted selections. The research was conducted in eastern New Mexico, west Texas, and Oklahoma. All the experiments were planted in a randomized complete block design with three replicates. The main objective of this study was to evaluate Valencia peanut varieties for pod yield, quality, and net return.

Meeting the Needs of New Mexico: Peanut growers face challenges in producing high-yield, good quality peanuts that meet market standards for oil content, and flavor, which limit their access to markets. Improved Valencia cultivars offer farmers the opportunity for higher yields, disease resistance, and better-quality peanuts. These varieties help reduce production costs, enhance sustainability, and open up new market opportunities, ultimately improving farmers' profitability and long-term success.

Impacts: The newly developed Valencia cultivars have resulted in high productivity and profitability. The improved cultivar was less affected by soil-borne pathogens, which reduced crop losses. The quality of the peanut was better, with a sweet taste, four seeds per pod, better flavor, and larger seed size. As a result, farmers can access premium markets, get higher prices, and meet the growing demand for high-quality peanuts. Furthermore, these cultivars have performed well in the hot and dry climates of eastern New Mexico and western Texas, allowing growers to select a variety best suited to their local conditions.

Funding Acknowledgment: New Mexico Peanut Research Board and National Peanut Research Board

Aerial view of Valencia breeding plots on a grower's field in Morton, Texas

Screening of Peanut Lines for Stem Rot Disease Resistance

Investigators: Naveen Puppala (npuppala@nmsu.edu) and Manisha Ojha

Project Overview: Stem rot, caused by the fungal pathogen *Sclerotinia rolfsii*, is a devastating disease in peanut, causing a yield loss of 10 to 50% in seriously infected field conditions. This fungus has a natural ability to develop resistance to fungicides, limiting their effectiveness. Therefore, developing disease-resistant cultivars is crucial to address this issue. Understanding the molecular basis of peanut resistance to stem rot is critical for advancing sustainable disease management strategies. The identification of the key genes involved in plant defense mechanisms is necessary to enhance our understanding of host-plant interaction at the molecular level. This study employed RNA sequencing to unravel the molecular mechanisms of resistance by analyzing the gene expression profiles of a resistant peanut genotype (Georgia-03L) and a susceptible genotype (Valencia C) under normal and infected conditions.

Meeting the Needs of New Mexico: One of the major factors affecting crop production is a soil-borne disease. Developing disease-resistant peanut cultivars reduces the reliance on chemical fungicides and lowers production costs, which ultimately minimizes environmental contamination and promotes soil health. Growers can save on fungicide applications and other disease management practices, which improves their profitability. Resistant lines are less likely to suffer yield losses due to stem rot, leading to higher yield and more stable peanut production.

Impacts: This study demonstrated that the resistant genotype activated key defense-related genes upon infection, which play a critical role in the plant immune system. These findings provide valuable insights into how Georgia-03L effectively defends itself against *S. rolfsii*. As a result, this research will help to identify new genetic targets and pathways for developing disease-resistant peanut varieties, advancing breeding strategies, and contributing to more resilient crops. Furthermore, screening peanut lines for stem rot resistance is a crucial step toward sustainable peanut production, offering economic, environmental, and agronomic benefits. Additionally, it helps to reduce costs associated with pest and disease management and minimizes reliance on chemical pesticides.

Funding Acknowledgment: New Mexico Peanut Research Board and National Peanut Research Board

Gene expression study from a susceptible peanut variety (left) and a resistant variety (right) after artificial inoculation of the stem rot fungus (Athelia rofsii).

Screening of Peanut Lines for Drought Tolerance

Investigators: Naveen Puppala (npuppala@nmsu.edu) and Manisha Ojha

Project Overview: Peanut is a globally important legume, with about 70% of its cultivation occurring in arid and semi-arid regions, where drought stress is common. These conditions not only reduce yield but also increase the risk of aflatoxin contamination. Drought and heat stress, particularly mid-season drought during pod and seed formation and terminal drought during pod filling, is a major factor contributing to yield loss. Additionally, the depletion of aquifers due to growing water demand has reduced the water availability for irrigation. Developing drought-resistant peanut varieties that are adaptable to drought and heat stress is crucial for ensuring stable production in arid and semi-arid regions. This research aims to screen advanced breeding lines of peanut in fully and limited irrigated conditions in West Texas for pod yield, grade, and net return.

Meeting the Needs of New Mexico: Developing drought-tolerant peanut varieties will help growers produce higher quality peanuts and also minimize aflatoxin contamination even during periods of water scarcity. Furthermore, farmers can reduce overall production costs by lowering irrigation costs and conserving local water resources. It also helps farmers adapt to climate change, reduce production risks, and maintain stable yields.

Impacts: Screening peanut lines for drought tolerance is a vital step toward improving crop resilience and promoting sustainable agriculture in water scarce regions. This study will help farmers to select varieties that can better withstand periods of water stress. This study showed an increase in pod yield by 10-36% in advanced genotypes compared to control Valencia-C. Four peanut lines performed better under limited irrigated conditions.

Funding Acknowledgment: New Mexico Peanut Research Board and National Peanut Research Board

Drone image of the peanut field under drought stress at USDA-ARS- Cropping System Research Lab.

Organic Seed Treatment Study in Valencia Peanut

Investigators: Naveen Puppala (npuppala@nmsu.edu) and Manisha Ojha

Project Overview: The increasing demand for organic peanuts is regarded as the fastest-growing sector in the United States. Growers are attracted to organic peanut production because of higher price premiums for certified organic over conventional peanuts. Organic peanut production is traditionally confined to the southwest part of the U.S., and the largest producers of organic peanut production are eastern New Mexico and West Texas. Many growers are interested in growing certified organic peanuts for organic processed peanut foods, but the wide range of biotic and abiotic stress affects its production. The main challenges in organic peanut production include managing weeds, controlling soil-borne diseases, and preventing insect infestations. The objective of this project is to evaluate the effectiveness of bio-fungicide convergence for the control of pod rot in peanuts and its effect on pod yield and grade of peanuts.

Meeting the Needs of New Mexico: Soil-borne diseases are major challenges in peanut production. Using organic fungicides as a seed treatment protects seeds from soil-borne pathogens, leading to a higher germination rate and enhanced early-season disease resistance. Additionally, it also reduces reliance on chemical pesticides and thus reduces the input costs for pest management.

Impacts: This study showed that using organic biofungicides as a seed treatment improves the seedling establishment by protecting the seeds from soil-borne pathogens. It improved disease resistance during the early growth season, leading to higher yield, improved quality, and greater net returns. The findings showed that the use of biofungicides increased pod yield by 6-43% compared to untreated control. Organic biofungicides as a seed treatment not only enhance peanut productivity but also reduced environmental impact, and supported the long-term soil health and economic returns.

Statistical differences were observed among lint yield, loan value, and net return among the varieties. The average seed cotton yield across the trial was 1744 lb/ac, with FM 832 AXTP (1906 lb/ac) being the highest-yielding variety. Lint yield for fourteen varieties in the trial ranged from 726 to 881 lb/ac with a trial average of 786 lb/ac. The highest lint yield was 881 lb/ac for FM 832AXTP, followed by DP2317 B3TXF 854 lb/ac. The estimated net return was higher for FM 832 AXTP (USD 457.8), followed by DP 2317 B2XF (USD 444). The average net return of an experimental trial was USD 404.

Funding Acknowledgment: New Mexico Peanut Research Board and National Peanut Research Board

Application of Convergence 1x rate on peanuts grown in Mortan, Texas-2024 growing season

Application of Convergence 2x rate on peanut grown in Mortan, Texas-2024 growing season

Cotton Variety Trial

Investigators: Naveen Puppala (npuppala@nmsu.edu) and Manisha Ojha

Project Overview: The depletion of the Ogallala Aquifer has led to declining water levels, making it harder for farmers to access sufficient water for irrigation. Therefore, farmers lean more towards the crop with low water requirements, and cotton is one of the drought-tolerant crops that is getting popular among the farmers in Curry, Lea, and Roosevelt counties. This research aims to evaluate commercial varieties from seed companies and provide unbiased data on yield, lint quality, and net return from each variety tested in the 2024 growing season. The data collected from this study will help cotton growers select cotton varieties that offer higher yields, possess desirable fiber qualities, and mature earlier. This work aimed to evaluate fourteen commercial cotton varieties suitable for eastern New Mexico.

Meeting the Needs of New Mexico: It helps farmers to identify the best performing cotton varieties in hot and limited water availability areas. Farmers can improve crop productivity, sustainability, and profitability.

Impacts: This trial provides information to farmers with access to better performing and resilient cotton varieties suitable in this area. Farmers can increase yields, improve fiber quality, and reduce production costs which ultimately leads to higher profitability and improved livelihoods.

Funding Acknowledgment: BASF, Bayer, Brownfield Seed & Delinting and Phytogen

Overview of the cotton research plots at harvest

Physiological Responses to Light in Drought-Susceptible and Drought-Tolerant Novel Peanut (*Arachis Hypogaea* L) Genotypes

Investigators: Naveen Puppala (npuppala@nmsu.edu), Krishna Reddy, Saseendran S Anapalli, Rajanna G Adireddy, and Manisha Ojha

Project Overview: Drought is a major abiotic stress that reduces peanut yield by altering photosynthetic activity, impacting crop growth, and assimilating mobilization towards sink tissues. Therefore, it is imperative to develop climate-resilient peanut genotypes with enhanced photosynthetic processes. This study focuses on the effect of light on photosynthetic activity and stress tolerance in genotypes for drought environments. This study evaluated changes in photosynthesis and chlorophyll fluorescence in newly bred drought-tolerant peanut genotypes. Ten genotypes were tested under full irrigation and deficit irrigation in a split-plot design with four replications.

Meeting the Needs of New Mexico: Due to the decline in underground water, farmers are facing problems with irrigation in New Mexico. This study sheds light on peanut genotypes that tolerate water stress and still perform well under various light intensities. Identification of genotypes that can efficiently maximize photosynthetic and water use efficiency during periods of low water availability and high light intensities helps to select the most suitable varieties.

Impacts: High photosynthetic activity under deficit irrigation and high light exposure enhances water use efficiency and overall productivity of peanut variety in drought conditions. Genotypes such as NM-5, NM-74, and NM-77 that efficiently utilize light and water are well-suited for water limited environments with adequate sunlight. These varieties maintain consistent photosynthetic performance under stress, crucial for growth in drought-prone areas. Their ability to maximize photosynthetic efficiency in intense sunlight makes them ideal genotypes for New Mexico where drought coincides with high light exposure.

Funding Acknowledgment: Oak Ridge Institute for Science and Education (ORISE)

Peanut Varieties grown inside a Greenhouse at USDA-ARS, Production Systems Research Unit at Stoneville,

Measuring Photosynthesis on plants subjected to drought and light stresses.

Variety Evaluation for Malawi Agroecological Zones

Investigators: Naveen Puppala (npuppala@nmsu.edu), Justus Chintu, Veronica Guwela, and Manisha Ojha

Project Overview: In Malawi, limited peanut varieties are grown, many of which are neither high-yielding nor disease-resistant and require long growing seasons. Variety trial evaluation is a crucial process in agriculture that involves testing and assessing different varieties across multiple environments over several growing seasons to determine their performance with respect to yield, disease resistance and adaptability. This trial was conducted in nine locations and compared twelve varieties under diverse conditions to ensure consistent and stable performance. This study specifically focuses on evaluating varieties' resistance to local diseases and pests, which is important for reducing input costs and environmental impact. Quality traits like flavor, oil content, and nutritional value are also assessed to meet market demands. Data collected from these trials was analyzed to identify the best-performing varieties, which are then considered for large-scale production and commercialization, ensuring that farmers and consumers receive high-quality, reliable crops.

Meeting the Needs of New Mexico: This study will help farmers identify varieties that are best suited to specific soil types, climate, and water availability, leading to higher yields and better performance. It also helped to identify varieties with natural resistance to diseases such as leaf spot, rust, and rosette disease, reducing the need for chemical pesticides, and thus enhancing crop health.

Impacts: In Malawi, peanuts have long been a key pillar of the economy. The adoption of high yielding varieties not only boosts the economy but also improves food security and promotes sustainable farming. It helps to increase productivity, net return, and enhanced quality. Additionally, producing high-quality peanuts with desirable traits like flavor and oil content helps meet market demands.

Funding Acknowledgment: Peanut Innovation Lab (University of Georgia)

Research Plots at 90 days after planting prior to Rosette Disease infestation

Research Plots at harvest after severe Rosette Disease infestation

Key Soil Properties Influencing Soil Water Infiltration in Semi-Arid Region Under Regenerative Farming Practices

Investigators: Prakriti Bista (pbista@nmsu.edu), Sangu Angadi, Rajan Ghimire and Sangam Panta

Project Overview: Improving soil water infiltration is vital to enhancing water use efficiency in annual crop production systems in water-limited regions. Regenerative practices have shown potential for improving soil physical, chemical, and biological health while supporting various ecosystem functions. A study was conducted at the Agricultural Science Center in Clovis, NM, to assess major soil properties influencing water infiltration dynamics (Kfs) under regenerative practices such as perennial grass strips alternating with crop strips, cover cropping, and tillage management. The Kfs measurements were taken using a SATURO dual-head infiltrometer. Soil samples (0-15cm) were used to investigate soil bulk density, moisture content, residue cover, dry aggregates, water-stable aggregates, pH, and total carbon and nitrogen content. Regenerative farming, such as perennial grass buffer, no-tillage, and cover cropping, improved Kfs compared to the conventional control. Bulk density and water-stable aggregates were two major drivers of Kfs. Bulk density had negative and water-stable aggregates had positive correlations with Kfs.

Meeting the Needs of New Mexico: Water is a critical factor limiting agricultural production in semi-arid New Mexico, where water scarcity and high evapotranspiration rates pose significant challenges. This study identified the major soil properties that supported increased soil water infiltration across various regenerative practices. This knowledge will help New Mexico growers tailor their management practices to obtain desired changes in soil properties and improve soil water infiltration for long-term agricultural sustainability.

Impacts: Diverse regenerative practices such as perennial grass buffer, cover crop, and no-tillage had high soil water infiltration compared to conventional cropping practices. This study highlighted the positive impact of regenerative practices on soil properties, such as increased soil porosity, decreased soil bulk density, and improved soil aggregation, leading to higher soil water infiltration than conventional practices. Shifting conventional practices to regenerative farming practices can be vital for soil water conservation in arid and semi-arid regions.

Soil water infiltration measurement using Saturo Dula Head at Agricultural Science Center Clovis, NM

Dual-Function Engineered Biochar for Excess Soil Phosphorus Sorption with Subsequent Slow Release for Cost-Effective and Sustainable Crop Production

Investigators: Dr. Rajan Ghimire (rghimire@nmsu.edu) and Dr. Juan P. Frene (NMSU), Dr. Sushil Adhekari (Auburn University), Dr. Deb Jaisi (University of Delaware), Dr. David O'Connell (Trinity College of Dublin), and Dr. Suzanne Higgins (AFBI)

Project Overview: This project aims to utilize a carbon-rich agricultural waste to develop a modified biochar that enhances nutrient utilization, specifically phosphorus, in agricultural production. The project will assess the capacity of modified biochar to absorb phosphorus and its subsequent slow release, facilitating more efficient crop utilization. This project is conducted simultaneously across Ireland, the UK, and the USA. The engineered biochar is expected to mitigate the adverse effects of agriculture, including environmental pollution associated with P accumulation while enhancing the cost-effectiveness of nutrient fertilizers for farmers. Finally, this project is combined with field experiments to demonstrate the use of biochar in crop production in eastern New Mexico.

Meeting the Needs of New Mexico: This project aims to enhance the resilience and sustainability of agriculture in New Mexico by enhancing nutrient use efficiency and reducing environmental footprints. This project has two primary objectives for New Mexican farmers. First, to develop a product that enables producers to reduce costs by utilizing fewer resources to achieve equivalent yields. Second, it seeks to mitigate the adverse effects of agricultural production, particularly environmental pollution resulting from excessive nutrient leaching. This project promotes the implementation of novel technology, such as biochar, in specific local conditions to maximize its advantages.

Impacts: The primary goal is to improve understanding of the effectiveness of biochar as a soil amendment and ultimately develop it as a biofertilizer that serves as a source of phosphorus for plants and crops. The project team is developing a biochar that absorbs nutrients and progressively releases them when the plants require them, thereby improving the phosphorus utilization in the soil. By enhancing the utilization of phosphorus, the environmental impact of agriculture will be reduced, the cost of crop production will be reduced, and agricultural systems will be more resilient to climate change. This project aims to customize biochar to meet the requirements of local farmers, as it is one of the most promising agricultural technologies. It also attempts to disseminate the technology through field demonstrations, field day presentations, and sharing results at other farmer conferences.

Funding Acknowledgment: USDA National Institute of Food and Agriculture (2023-69016-39062)

Cover Crop and Dairy Compost Effects on Soil Health

Investigators: Dr. Rajan Ghimire (rghimire@nmsu.edu), Adebayo Olufemi, Sangu Angadi, and Prakriti Bista

Project Overview: Water scarcity in arid and semi-arid regions challenges farmers to manage soil and water efficiently for sustainable crop production. This study examines how compost and cover crops influence soil moisture, water use, and sorghum yield in eastern New Mexico. Over two years, three treatments of cover crops were tested: no cover crop (fallow), pea, and a six-species mix, with and without compost. Findings show that compost improved soil moisture and enhanced sorghum yield by 22-29%. While the six-species mix had less water earlier in the season, it stored more water at sorghum harvest, providing more water for the succeeding crops.

Meeting the Needs of New Mexico: New Mexico's agriculture faces low rainfall and water scarcity challenges, making efficient soil and water management essential for sustaining crop production. This study provides practical solutions by demonstrating how compost and cover crops can interact to enhance soil moisture retention, reduce water loss, and improve crop yields. By increasing sorghum productivity by 22-29%, compost can help farmers achieve better returns with the same water input. The findings support sustainable farming practices that conserve water while maintaining soil health, benefiting New Mexico's farmers and communities by promoting long-term agricultural resilience in the state's semi-arid environment.

Impacts: Water scarcity limits agricultural productivity in New Mexico, urging the need for innovative soil and water conservation strategies. This study demonstrates that integrating compost with cover cropping can enhance soil moisture retention, reduce water stress, and increase crop water productivity in semi-arid cropping systems. Compost-treated plots maintained higher soil water content and increased sorghum yields by 22-29%, showcasing its role in improving drought resilience. While the six-species cover crop mix initially retained less water, it improved storage over time, suggesting benefits for long-term soil health. These findings provide valuable guidance for farmers seeking to maximize water efficiency while sustaining yields. By promoting regenerative practices, this research supports long-term agricultural sustainability in New Mexico, helping farmers conserve water, improve soil health, and enhance crop production, ultimately strengthening food security and the rural economy.

Funding Acknowledgment: United States Department of Agriculture, National Institute of Food and Agriculture, grant #/ 2022-67019-36106

Develop Effective Adaptation Strategies to Enhance the Resilience of Farmers Under Changing Climate

Investigators: Dr. Rajan Ghimire (rghimire@nmsu.edu), Shannon Norris-Paris, Jinfa Zhang, Sundar Sapkota, and Piumi Yaddehi

Collaborating Agricultural Science Center: Leyendecker Plant Science Center

Project Overview: This project aims to create engineered biochar from forest biomass and manure waste that reduces greenhouse gas (GHG) emissions, particularly nitrous oxide (N_2O), and improves soil nutrient cycling. The project assesses the ability of engineered biochar to mitigate N_2O emissions, enhance soil health, and use N under various moisture levels and soil types. It also considers how biochar and compost influence soil carbon stability, macropore properties, and drought tolerance in peanuts and cotton. Engineered biochar is expected to enhance N use and mitigate GHG emissions, enhancing climate resiliency. The research is being conducted in New Mexico and Auburn, with a demonstration plot in Clovis to show the impacts of biochar and compost on soil health and crop production in semi-arid environments.

Meeting the Needs of New Mexico: This project aims to enhance the resilience of New Mexico farmers in a changing climate and increase agricultural sustainability by minimizing soil nitrogen loss as GHG gases, improving nutrient use, and building soil health. Exogenous carbon inputs from biochar and compost can help build organic matter and promote carbon sequestration in low-fertility NM environments. The project utilizes locally sourced resources, such as biomass and compost, through novel biochar technology to maximize soil benefits while reducing farming costs and environmental impact.

Impacts: The primary goal of this project is to enhance agricultural resilience to a changing climate and reduce the environmental impacts of farming. The project seeks to deepen the understanding of how engineered biochar and compost amendments can mitigate emissions, increase carbon stability, and improve soil health. The research team is developing engineered biochar with specific properties tailored to enhance nutrient absorption and release, reduce GHG formation, and minimize N leaching. The project will also provide insights into the drivers of GHG emissions in semi-arid cropping systems. By reducing nitrogen loss and improving soil health, engineered biochar will lessen the environmental impact of agriculture and boost system resilience to changing climate. Demonstration plots will encourage local farmers to adopt this technology. Results will be shared through field days, workshops, newsletters, conference presentations, and peer-reviewed publications.

Establishing Soil Health in Lands Transitioning from Irrigated to Dryland Production

Investigator: Dr. Rajan Ghimire (rghimire@nmsu.edu)

Project Overview: Shifting from irrigated to dryland agriculture can lead to significant soil organic carbon losses and increased greenhouse gas emissions. Management practices such as cover crops and perennial crops can help mitigate these losses by enhancing carbon sequestration and improving soil health. This study evaluated the impact of winter cover crops on soil health and greenhouse gas emissions in irrigated lands and the fields transitioning from irrigation to dryland under a forage corn-sorghum rotation. The treatments included: (1) no-cover crops control, (2) grass only, (3) grasses, brassica, and legumes mixture (residue retained), and (4) mixtures of grasses, brassica, and legumes (residue removed). Greenhouse gas emissions were measured weekly, while soil samples were collected to assess key soil health indicators. Soil sensors were installed to monitor soil moisture and temperature dynamics continuously. Also, forage dry matter yield and nutritive value were analyzed.

Meeting the Needs of New Mexico: Eastern New Mexico is facing challenges in agriculture because of declining irrigation capacities in the region, resulting in a rapid transition from irrigated to dryland agriculture. This project examines the agronomic, environmental, and soil health benefits of diverse cover crops in irrigated and dryland forage systems. The findings from this study will guide farmers in semi-arid regions in selecting the best cover crop options for a successful transition from irrigated to dryland agriculture, promoting sustainable and resilient forage production.

Impacts: This study is work in progress. The ongoing study will provide valuable insights for beef and dairy farmers, offering management recommendations to improve forage production and quality. In addition, the project aims to showcase environmental benefits, such as enhanced soil health and reduced wind and water erosion.

Funding Acknowledgement: New Mexico Department of Agriculture

Cover Crop Impacts on Soil Water and Nitrogen Dynamics and Silage Yield in Semi-Arid Regions

Investigators: Dr. Rajan Ghimire (rghimire@nmsu.edu), Prakriti Bista, John Idowu, and Atinderpal Singh

Project Overview: Efficient soil water management is essential for sustainable crop production in arid and semi-arid regions of the southwestern United States. Using the Root Zone Water Quality Model (RZWQM2), this study evaluated soil water content, nitrogen (N) dynamics, and forage cron-sorghum yields in cover crop integrated rotation. Treatments included no cover crops, a mixture of grasses, brassicas, and legumes, a mixture of grasses and brassicas, and a mixture of grasses and legumes under maize and sorghum silage production. Results showed higher soil moisture storage, lower temperature, increased soil mineralization, and improved plant N uptake under corn and sorghum following cover crops. The study showed that integrating cover crops in forage systems can enhance soil water conservation, N efficiency, and yield under semi-arid irrigated conditions.

Meeting the Needs of New Mexico: This study evaluated the soil water content and nitrogen dynamics in the 0–100 cm soil profile under winter cover crops and subsequent forage corn and sorghum yield resulting from winter cover crop residue retention in a semi-arid environment. Simulated soil water, N dynamics, and yield under winter cover crops in forage maize and sorghum helped to identify the optimal winter cover crop species mixture for sustainable water management in forage production systems, especially in water-limited regions of New Mexico. New Mexico farmers can benefit from cover cropping under irrigated systems by selecting cover crop species and mixtures with low water use.

Impacts: The results indicated that soil water content during the main crop phase was higher and soil temperature was lower following cover cropping than no-cover crops, highlighting their potential for soil water conservation. The cover crops enhanced N mineralization and yield forage corn and sorghum biomass. These findings support using winter cover crops in forage production systems to reduce water and N losses while improving productivity in semi-arid environments and net economic benefits.

Forage Productivity and Soil Health Dynamics Under Alfalfa-Bermudagrass Mixtures

Investigator: Dr. Rajan Ghimire (rghimire@nmsu.edu), Pramod Acharya, Mark A. Marsalis, Jourdan M. Bell[*], Anuoluwapo Ogunleye[**]

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Collaborating Agricultural Science Center: Los Lunas Agricultural Science Center

Project Overview: Integrating legumes into water- and nitrogen-limited forage systems could benefit soil health and forage yield. However, there is not enough evidence on the agronomic and ecosystem service benefits of these systems, specifically in arid and semi-arid regions. This study (2021–2024) evaluated agronomic performance (forage productivity and nutritional composition) and soil health dynamics under two winter-hardy bermudagrass varieties (Cheyenne II and Wrangler), with and without interseeded alfalfa. Results showed that the bi-mixtures of alfalfa and bermudagrass dry matter forage yield were comparable to sole bermudagrass treatments despite no nitrogen fertilizer application on the alfalfa interseeded systems. Interestingly, the relative forage quality was generally greater in alfalfa-bermudagrass mixtures. Labile pools of soil carbon and nitrogen were mostly similar for all forage systems.

Meeting the Needs of New Mexico: Shortages in irrigation water and growing livestock industries in the southern High Plains seek alternative forage management solutions. Improving management practices in drought-tolerant perennial forage systems could reduce reliance on the Ogallala aquifer, enhance soil health, and increase the economy for limited irrigation acreages. This study tested the efficacy of alfalfa integration in two drought-tolerant bermudagrass varieties and found that legume integration not only served as the companion crop to bermudagrass for nitrogen supplementation but also produced comparable yields with better quality forage. Such evidence helps producers in designing cropping systems for increased farm productivity and profitability, while regenerating low-fertility soils.

Impacts: The livestock industry is actively looking to sustain and improve forage production through innovative management solutions. Given the challenges posed by declining water resources, deficit-irrigated perennial forages, such as interseeded alfalfa-bermudagrass, can minimize irrigation demands while offering higher quality forage for grazing and a viable option for harvested roughage. Results from this study support the hypothesis that the alfalfa integration in drought-tolerant bermudagrass reduces nitrogen fertilizer costs, sustains forage production, and improves forage quality to support the regional dairy and beef cattle industries.

Funding Acknowledgement: USDA-Natural Resources Conservation Service, New Mexico (Grant # GR0007378 and GR0006511)

By the Numbers

Research Publications

Peer-Reviewed Journal Publications

- Dotun Arije; Rajan Ghimire; Prakriti Bista; Sangamesh V. Angadi; Charlotte C. Gard. 2024. Soil organic carbon recovery in semi-arid drylands with years of transition to perennial grasses. Journal of Arid Environments: 225: 105263. https://doi.org/10.1016/j.jaridenv.2024.105263
- Frene, P. Juan, Rajan Ghimire, Sundar Sapkota, and Sangamesh V. Angadi. 2024. Evaluating the potential of circular grass buffer strips to promote fungal community and soil health in water-limited agroecosystems. Soil Ecol. Lett., 2025, 7(1): 240265. https://doi.org/10.1007/s42832-024-0265-z
- Sapkota, S., R. Ghimire, S. Angadi, B. Schutte, and O.J. Idowu. 2024. Regulation of soil carbon and nitrogen storage by soil aggregates in center pivot irrigated cropping systems with circular grass buffer strips. Journal of Soils and Sediments. https://doi.org/10.1007/s11368-024-03721-0
- Sapkota, S., R. Ghimire, and S.V. Angadi. 2024. Regulation of surface and sub-surface soil organic carbon sequestration in water-limited landscapes with integration of circular perennial grass buffer strips. Applied Soil Ecology. 202: https://doi.org/10.1016/j.apsoil.2024.105551
- Jagdeep Singh, Sangu Angadi, Sultan Begna, Dawn VanLeeuwen, Omololu John Idowu, Paramveer Singh, Calvin Trostle, Prasanna Gowda and Catherine Brewer. 2024. Deficit irrigation strategy to sustain available water resources using guar. Industrial Crops and Products. 211. https://doi.org/10.1016/j.indcrop.2024.118272
- Lauriault, L.M.; Angadi, S.V.; Duff, G.C.; Scholljegerdes, E.J.; Darapuneni, M.K.; Martinez, G.K. Influence of Grazing on Canola Grain, Canola Forage Yield, and Beef Cattle Performance. Animals 2024, 14, 371. https://doi.org/10.3390/ani14030371
- Ramos Coronado, L.; Miller, M.; Angadi, S.V.; Lauriault, L.M. 2024. Initial Evaluation of the Merit of Guar as a Dairy Forage Replacement Crop during Drought-Induced Water Restrictions. Agronomy 2024, 14, 1092. https://doi.org/10.3390/agronomy14061092
- Pushpesh Joshi, Pooja Soni, Vinay Sharma, Surendra S. Manohar, Sampath Kumar, Shailendra Sharma, Janila Pasupuleti, Vincent Vadez, Rajeev K. Varshney, Manish K. Pandey and Naveen Puppala*. Genome-Wide Mapping of Quantitative Trait Loci for Yield-Attributing Traits of Peanut. Genes 15(14) https://doi.org/10.3390/genes15020140
- Meng, S., SKC Chang, J Li, N Puppala. 2024 Identification and Protein Characterization of Peanut Lines with Relatively Lower Levels of Major Allergens. Agriculture Research and Technology. 28(5) pp1-13
- Sangita Subedi, Manisha Ojha, Dennis Nicuh Lozada, Suresh Madugula, Soum Sanogo, Robert Steiner & Naveen Puppala*. 2024. Phenotypic evaluation of USDA peanut (*Arachis hypogaea* L.) mini-core collection for resistance against stem rot caused by *Sclerotium rolfsii* Sacc. Archives of Phytopathology and Plant Protection. 56(20) pp 1597-1612
- Djaman, K., DS Djaman, N Puppala, M Darapuneni. 2024. Plant nutrient removal and soil residual chemical properties as impacted by maize planting date and density. Plos one 19 (3) pp1-17
- Wang, ML., B Tonnis, X Li, R Benke, E Huang, S Tallury, N Puppala. 2024. Agronomy Journal. Genotype, environment, and their interaction effects on peanut seed protein, oil, and fatty acid content variability. Agronomy Journal. 116 (2024), pp. 1440-1454
- Pugh, NA., A Young, M Ojha, Y Emendack, J Sanchez, Z Xin, N Puppala. 2024. Yield prediction in a peanut breeding program using remote sensing data and machine learning algorithms. Frontiers in Plant Science 15 pp 1-17.
- Sachin Phogat, Sriharsha V. Lankireddy, Saikrishna Lekkala, Varsha C. Anche, Venkateswara R. Sripathi, Gunvant B. Patil, Naveen Puppala, Madhusudhana R. Janga. 2024. Progress in genetic engineering and genome editing of peanuts: revealing the future of crop improvement. Physiology and Molecular Biology of Plants. https://doi.org/10.1007/s12298-024-01534-6
- Sapkota, S., R. Ghimire, C Brewer, S. Fernando. 2025. Soil health, carbon mineralization kinetics, and crop yield responses of biochars derived from pecan wood, hemp residues, and cattle manure. Journal of Soils and Sediments. https://doi.org/10.1007/s11368-025-03968-1
- Sapkota, S., R. Ghimire, P. Bista, D. Hartmann, T. Rahman, S. Adhikari. 2024. Greenhouse gas mitigation and soil carbon stabilization potential of forest biochar varied with biochar type and characteristics. Science of the Total Environment. https://doi.org/10.1016/j.scitotenv.2024.172942
- Singh, A., P. Bista., S.K. Deb., and R. Ghimire (2025). Simulating cover crops impacts on soil water and

nitrogen dynamics and silage yields in the semi-arid southwestern United States. *Agricultural Water Management*, *307*, p.109246. doi.org/10.1016/j.agwat.2024.109246.

Other Publications / Conference Proceedings

- NMSU MS Thesis: Effect of Biochar Application Rates on Crop Performance and Soil Quality By Abdullai Hussaini Liman
- Panta, S., Bista, P., Angadi, S.V. and Ghimire, R., 2024, November. Influence of Soil Properties on Soil Water Infiltration Under Diverse Crop Management Practices in Semi-Arid Cropping System. In *ASA, CSSA, SSSA International Annual Meeting*. ASA-CSSA-SSSA
- Singh, A., R. Ghimire and O. J. Idowu (2024). Mitigating greenhouse gas emissions with cover cropping in lands transitioning from irrigated to dryland forage production. ASA, CSSA, SSSA International Annual Meeting, November 10-13, San Antonio, TX. https://scisoc.confex.com/scisoc/2024am/meetingapp.cgi/Paper/156686
- Singh, A., and R. Ghimire (2024). Numerical simulation of root water uptake of forage corn in semi-arid conditions. Western Society of Crop Science Annual meetings, held on July 17–18 in Monterey Bay, CA.

Grants and Contracts

- USDA-NIFA-Foundational Program (Grant# 2024-67013-42345)
- USDA-NIFA-Foundational Program (Grant# 2020-38624-32472)
- USDA-NIFA-Foundational Program (Grant# 2024-67013-42345)
- USDA-NIFA-SAC (Grant# 2021-38624-35736)
- USDA-NIFA-Foundational Program (Grant# 2020-67019-31155)
- USDA-NIFA-Sustainable Agricultural Systems (Grant# 2024-68012-41750)
- USDA NRCS GR006511-$200K
- USDA NIFA No. 2022-67019-36106- $750K
- USDA NIFA (2023-69016-39062)
- USDA NIFA (Grant#/ 2022-67019-36106)
- DOE-Energy EarthShot Research Centers (LANL 559667-C7274)
- NMSU Carbon Management and Soil Health Initiative, project # GR0007378 of USDA Natural Resources Conservation Services, and additional support from the NMDA Healthy Soil Program.
- Puppala, N. (Principal) "Malawi Early Generation Seed Production" -2024. USAID – Peanut Innovation Lab, University of Georgia. Total Award: $32,287, (February 15, 2024 - September 30, 2025).
- Puppala, N. (Principal) "Valencia Peanut Breeding for High Yield, High Oleic Oil Content, Early Maturity with Favorable Amino Acid Profile. Total Award $ 79,936.50. (September 1, 2024 to August 31, 2025).
- Puppala, N. (Principal) "Valencia Peanut Breeding For Drought Tolerance-2024 National Peanut Board. Total Award $9,232.00 (January 1, 2024 – December 31, 2024).
- Puppala, N. (Principal) :Fungicide Studies on Peanut Yield and Grade", Certis Biologicals, $12,000, PI Total Award: $12,000.00, (January 1, 2024 – December 31, 2024).
- Puppala, N. (Principal), "Evaluating Corteva Breeding Lines for Yield and Fiber Quality", Sponsoring Organization: Corteva Agriscience, Total Award: $11,095.00, (January 1, 2024 - June 30, 2025).
- Dr. Jasmeet Lamba, Dr. Sushil Adhikari, Dr. Charles Chen, Dr. Neha Pontis (Auburn University), Dr. Rajan Ghimire, Dr. Jinfa Zhnag, Dr. Shannon Norris-Parish, and Dr. Sundar Sapkota (NMSU), Deb Jaisi (University of Delaware), funded by National Science Foundation (2316278), 2024-2028
- New Mexico Water Resources Research Institute (2023–2024): Numerical modeling of root water uptake of forage crops in semi-arid environments. PI: R. Ghimire. Co-PI: A. Singh*. Amount Awarded: $27,000

Outreach Activities

- Clovis ASC Annual Field Day - August 6, 2024
- Cultivating Young Minds Program - October 23-24, 2024. Approximately 743 students participated from 17 elementary schools
- College of AECS Open House Workshop, Las Cruces, NM - April 5, 2024. The Clovis ASC participated with a display and three posters.
- Several individual and small group tours
- YouTube Videos, Circular Buffer Strips of Native Perennial Grasses at NMSU Clovis. (January 26, 2022) (https://youtu.be/utKl1yq78CA).

Interim President Dr. Torres visit to Clovis ASC

People

Cooperators and Collaborators

Collaborating Outside NMSU Campuses

- Meagan Schipanski, Steve Fonte, Colorado State University
- Augustine Obour, Kansas State University
- Charles West, Lindsay Slaughter, Texas Tech University
- Megha N. Parajulee, Katie Lewis, A Payton Smith, Texas A&M University
- Jun Wang, Northwest University, China
- Babu Ram Khanal, Agricultural and Forestry University Nepal
- David Clay, Deepak Joshi, South Dakota State University
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- Sushil Thapa, University of Central Missouri
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- Monique Chan Huot, Nutriset, France
- Spurthi Nayak, Dharward University, India
- Mike Stamm, Kansas State University
- Perry Miller, Montana State University
- Kim Ogden, University of Arizona
- Jason Quinn, Colorado State University

USDA Locations

- Upendra Sainju, USDA-ARS Sydney MT
- Veronica Acosta-Martinez, USDA-ARS Lubbock TX
- Maysoon Mikha, USDA-ARS, Akron CO
- Stephen DelGrosso and Melania Hartman, USDA ARS Fort Collins, CO
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- Emendack, Yves, USDA-ARS, Cropping System Research Lab, Lubbock, Texas
- Prasanna Gowda, USDA-ARS, Stoneville, MS
- Robert Lascano, USDA-ARS, Lubbock, TX

National Lab

- Umakant Mishra, Argonne National Laboratory

- Courtland Kelly, Livermore National Laboratory

Industry and local non-government organizations (contributors in research)

- Curtis and Curtis Seeds, Clovis NM
- Quivera Coalition, Santa Fe NM
- New Mexico Health Soils Program

Advisory Committee

- Paul Stout (Chairman)
- Spencer Pipkin
- Rex Rush
- Blake Curtis
- Eric Palla (Vice Chairman)
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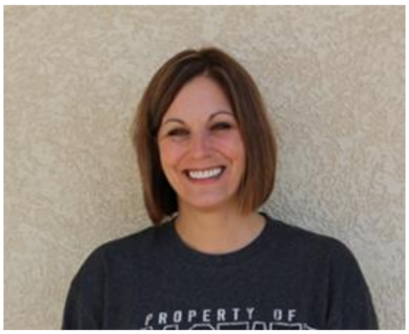

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