LOS LUNAS

NM STATE

ANNUAL REPORT —— 2021

The NMSU Agricultural Experiment Station supports research that is addressing real-world problems. Research is at the core of NMSU's mission to improve upon the lives of people globally.

https://loslunassc.nmsu.edu/

Notice to Users of This Report

This report has been prepared to aid Science Center staff in analyzing the results of the various research projects from the past year and to record data for future reference. These are not formal Agricultural Experiment Station Report research results. The reader is cautioned against drawing conclusions or making recommendations as a result of the data in this report. In many instances, data represents only one of several years' results that will ultimately constitute the final formal report. Although staff members have made every effort to check the accuracy of the data presented, this report was not prepared as a formal release. None of the data is authorized for release or publication without the written prior approval of the New Mexico Agricultural Experiment Station.

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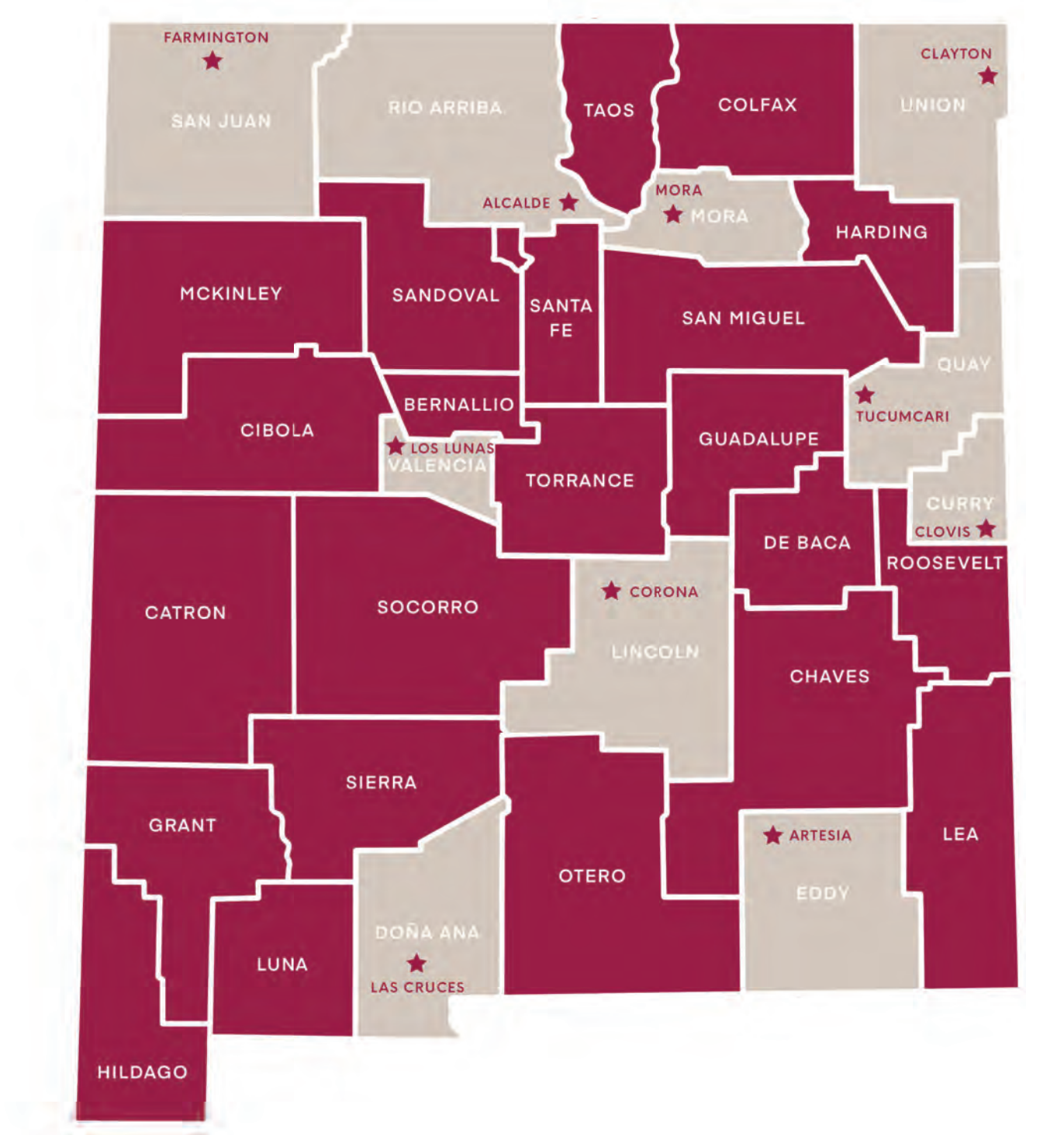
MISSION

The mission of the Agricultural Science Center (ASC) at Los Lunas is to conduct research and Extension programs on various crops, insects, and plant-based systems important to New Mexicans in the Middle Rio Grande Valley (MRGV) and throughout New Mexico. Through a cooperative agreement with the USDA-NRCS Los Lunas Plant Materials Center (PMC), the ASC– Los Lunas and PMC work together to solve agricultural and conservation issues.

NMSU Agricultural Experiment Stations



★ Station Locations

Contents

Executive Summary

Established in 1957, the 204-acre research farm began as a joint resource conservation venture with the USDA-Natural Resources Conservation Service. Initial NMSU research efforts were placed on forage and vegetable crops. Research expanded to include different crops including alfalfa, corn, sorghum, grapes (wine and table), pasture grasses, chile and other vegetables, turfgrass, native plants, fruit trees, and ornamental plantings. In addition, efforts were broadened to include insect (both beneficial and pest) and weed control studies. The multi-faceted programming at the ASC has produced significant improvements in species and variety selection, plant and water management, beneficial insects and pollinators, and integrated pest management (IPM). Programs address the needs of small- to medium- acreage farmers located on the 50,000+ irrigated acres of the MRGV, and urban gardeners in the largest urban region of the state, reaching thousands of people each year.

The Los Lunas ASC houses four on-site research and Extension faculty:

- Dr. Gill Giese: Extension Viticulture Specialist
- Dr. Mark Marsalis: Extension Forage Specialist
- Dr. Marisa Thompson: Extension Urban Horticulture Specialist
- Vacant: Integrated Pest Management Specialist

In addition, 7 main campus faculty conduct research projects at the Los Lunas ASC.

Primary research efforts focus on:

- Grape variety selection and vineyard management
- Tomato disease control
- Beneficial insect sustainability and ecosystem services
- Water and pest management in ornamental/landscape settings
- Chile varieties, harvest mechanization, and weed control
- Forage selection and improvement

Additional projects include jujube variety selection, guar production, and hemp variety studies.

Meeting the Needs of New Mexico

The Agricultural Experiment Station (AES) system is the research arm of New Mexico State University's (NMSU) College of Agricultural, Consumer, and Environmental Sciences (ACES), consisting of scientists on the main campus and at agricultural science centers (ASCs) throughout New Mexico. The 12 ASCs support fundamental and applied research under New Mexico's varied environmental conditions to meet the agricultural and natural resource management needs of communities in every part of the state. ASCs consist of two types: 1) facilities without resident faculty, which serve as research support field laboratories for campus-based faculty, and 2) off-campus facilities with faculty stationed at the centers that also serve, in part, as research support field laboratories for campus-based faculty.

The ASC–Los Lunas works together with the USDA Natural Resources Conservation Service (NRCS) Los Lunas Plant Materials Center to solve agricultural and conservation/reclamation issues statewide. In the late 1990s, the research and Extension efforts of the ASC-LL began to shift as stakeholder needs for information on diversified crops and homeowner landscapes increased. Faculty and staff at the ASC strive to provide sound, non-biased information to various stakeholder groups in the region. This information is based on state-of-the-art research and is delivered through aggressive Extension programs conducted both on-site and throughout the state. Needs assessment is informed by a local advisory board which guides how the ASC and faculty may address the most critical issues facing stakeholders.

2021 Financial Summary

Agricultural Science Center Los Lunas

Fiscal Year: **2021**

Fiscal Period: **30-Jun-21**

Department	Acct Type	Account Index Desc	Revenue YTD	Expense Budget	Expense YTD	Budget Balance Available YTD	Fund Balance Dr/(Cr)
Ag Science Ctr at Los Lunas	ESTABLISHING & ENHANCING POLLINATOR	NATIVE PLANT & POLLINATOR WORKSHOP		$15,271.00	$10,707.10	$4,563.90	
Ag Science Ctr at Los Lunas	IPM EDUCATION & OUTREACH IN NM COMM	DELIVERING IPM EDUCATION & OUTREACH		$468,743.38	$254,430.55	$214,312.83	
Ag Science Ctr at Los Lunas	LOS LUNAS PLANT MATERIALS CENTER	LOS LUNAS PLANT MATERIALS CENTER		$90,000.00	$75,372.51	$14,627.49	
Ag Science Ctr at Los Lunas	LOS LUNAS PLANT MATERIALS CENTER	CS LOS LUNAS PLANT MATERIALS CENTER		$66,600.00	$0.00	$66,600.00	
		Total Restricted Funds		**$640,614.38**	**$340,510.16**	**$300,104.22**	
Ag Science Ctr at Los Lunas	OVERHEAD TRANSFERS	START-UP A. BENNETT	$0.00	$0.00	$0.00	$0.00	$0.00
Ag Science Ctr at Los Lunas	SALES & SERVICE	PMC LOS LUNAS SALES	$0.00	$3,000.00	$0.00	$3,000.00	$0.00
Ag Science Ctr at Los Lunas	SALES & SERVICE	LOS LUNAS ASC SALES	$47,886.81	$10,000.00	$17,767.38	($7,767.38)	($21,275.96)
		Total Sales and Service Funds	**$47,886.81**	**$13,000.00**	**$17,767.38**	**($4,767.38)**	**($21,275.96)**
							* See Note
Ag Science Ctr at Los Lunas	STATE APPROPRIATIONS	ASC-LOS LUNAS SALARY		$343,913.96	$350,111.25	($6,197.29)	
Ag Science Ctr at Los Lunas	STATE APPROPRIATIONS	LOS LUNAS ADMIN		$53,148.00	$46,988.22	$6,159.78	
Ag Science Ctr at Los Lunas	STATE APPROPRIATIONS	FORAGE MANAGEMENT FOR NM		$35,000.00	$29,916.02	$5,083.98	
		Total State Appropriated Funds		**$432,061.96**	**$427,015.49**	**$5,046.47**	

Note: "( )" in the fund balance column indicates a positive number

Weather

The weather station at the Agricultural Science Center at Los Lunas has remained in continuous operation since its establishment in July 1957. Weather observations at the Agricultural Science Center at Los Lunas from 1958 - 2020 can be accessed online at https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?nm5150. Observations included here are average, maximum, and minimum air temperature and precipitation, from 2017-2021 (5-yr), and long-term averages (1958-2021); Tables 1 and 2. Pan evaporation and wind speed information is presented for 2021 only (Table 3).

Total precipitation for 2021 was 6.38 inches, 2.54 inches less than the long-term average of 8.92 inches (Table 1). Above-average precipitation was recorded in February, June, and July. All other months were below average, with some being significantly lower. Three months were recorded with zero precipitation. The greatest amount of precipitation falling within 24 hours (1.32 inches) was measured on July 7th, 2021.

Table 1. Summary of monthly precipitation amounts (inches) recorded at the NMSU Agricultural Science Center at Los Lunas, 2017-2021, and long-term average (1958-2021).

Month	2021	2020	2019	2018	2017	Average
January	0.22	0.23	0.56	0.00	1.43	0.38
February	0.46	0.93	0.41	0.37	0.94	0.42
March	0.12	0.75	0.33	0.12	0.16	0.46
April	0.32	0.38	1.46	0.00	0.87	0.48
May	0.00	0.19	0.40	0.09	0.42	0.45
June	0.78	0.30	0.53	1.36	0.05	0.56
July	2.44	1.28	1.13	1.19	0.60	1.38
August	1.21	0.15	0.44	0.62	3.12	1.62
September	0.44	1.10	0.53	0.89	1.71	1.15
October	0.39	0.62	0.64	2.26	1.11	1.04
November	0.00	0.06	2.36	0.11	0.00	0.47
December	0.00	0.25	0.33	0.50	0.00	0.51
Total	**6.38**	**6.25**	**9.12**	**7.51**	**10.41**	**8.92**

Table 2. Summary of mean monthly (2017-2021) and long-term average (1958-2021) temperatures at the NMSU Agricultural Science Center at Los Lunas.

Date	2021	2020	2019	2018	2017	Average (1958-2021)
……..……Mean Maximum Temperature (°F)……..……						
January	52	52	49	56	54	52
February	58	57	55	62	63	58
March	64	67	67	67	74	66
April	74	75	73	78	75	74
May	84	87	77	86	82	82
June	93	92	89	94	96	92
July	91	95	96	93	97	93
August	91	96	95	92	91	91
September	88	86	88	88	88	85
October	74	78	73	71	77	74
November	68	66	59	60	69	62
December	57	51	51	51	57	52
Annual	75	75	73	75	77	74
……..……Mean Minimum Temperature (°F)……..……..						
January	17	19	16	11	21	18
February	20	23	22	21	25	22
March	28	34	32	26	30	29
April	37	38	39	36	35	36
May	46	49	43	47	44	45
June	60	54	54	57	55	54
July	64	63	63	63	61	61
August	59	60	60	58	57	59
September	52	48	54	49	48	50
October	34	35	34	40	34	37
November	24	30	26	20	26	26
December	17	16	22	15	13	19
Annual	38	39	39	37	37	38
……..……..Mean Temperature (°F)……..……..						
January	35	36	32	33	37	35
February	39	40	38	42	44	40
March	46	51	49	47	52	47
April	56	57	56	57	55	55
May	65	68	60	67	63	63
June	77	73	72	76	76	73
July	77	79	79	78	79	77
August	75	78	78	75	74	75
September	70	67	71	68	68	68
October	54	57	53	56	56	56
November	46	48	42	40	47	44
December	37	33	37	33	35	35
Annual	56	57	56	56	57	56

The lowest temperature in 2021 was recorded on December 19th (3ºF).

The highest temperature for the year, 104ºF, was recorded on June 15th. May, June, September, November, and December exhibited higher mean maximum temperatures than the long-term averages.

The mean minimum temperature was 38ºF (equal to the long-term ave), and the mean annual temperature for 2021 was 56ºF (equal to the long-term ave.). (Table 2). Monthly mean temperatures were equal to or higher than long-term averages, except February, March, and October. The last spring temperature 32ºF or below in 2021 was recorded on April 24th (32ºF). The first temperature of less than 32ºF in fall was recorded on October 13th (26ºF). Average last spring and first fall freeze dates are April 17th and October 26th, respectively. The 2021 growing season was 172 days, which is similar to the long-term average.

Total snowfall in 2021 was 7.80 inches, with six events in January and February. The last snowfall was recorded on February 16th.

Table 3. Summary of pan evaporation (inches) and wind run (average miles per hour) at the NMSU Agricultural Science Center at Los Lunas, 2021.

	Pan Evaporation		Wind Speed
	2021		
Month	**Total**	**Daily Average**	**Daily Average**
	.....inches.....		mph
April*	3.91	0.26	3.1
May	10.0	0.32	2.5
June	10.2	0.34	1.6
July	9.5	0.31	1.0
August	8.8	0.28	1.6
September	7.0	0.23	1.5
October**	2.0	0.16	1.9
Season total/average	**51.4**	**0.27**	**1.8**

* April = Apr 16-30 only (begin measurement)

** Oct = Oct 1-13 only (end measurement)

2021
RESEARCH RESULTS

SHARPEN HERBICIDE FOR CONTROL OF PLANTAIN AND BINDWEED IN ALFALFA

Investigators: Leslie Beck (PI), Mark Marsalis, Leonard Lauriault

PROJECT OVERVIEW

Investigation of various herbicides labeled for use in alfalfa for efficacy on tough-to-control perennial broadleaf weeds. This project is conducted on both ASC and private landowner fields.

MEETING THE NEEDS OF NEW MEXICO

Field bindweed and plantain are difficult to control common weeds that greatly reduce competition by desirable plants and, therefore, alfalfa productivity; however, it is not known how effective new herbicide chemistries (i.e., saflufenacil) will control these weeds in alfalfa compared to tradional labeled herbicides.

RESEARCH IMPACTS

Reclaiming alfalfa land to reduce growth of weed species has the potential to increase hay productivity, economic benefit, and agricultural sustainability. Alfalfa is New Mexico's #1 cash crop and sustains the state's dairy, beef, and horse industries.

ASSOCIATED LONG-TERM PROGRAM OF RESEARCH

Non-Hatch; Long-term weed control efforts in forage crops in New Mexico, particularly tough-to-control perennial weeds.

ACES PILLAR

Water Use & Conservation; Food & Fiber Production and Marketing; Environmental Stewardship

INITIAL HEMP VARIETY TRIALS ACROSS NM ENVIRONMENTS

Investigators: Catherine Brewer (PI), Rebecca Creamer (PI), Hanah Rheay

PROJECT OVERVIEW

Cultivation of CBD, grain, and fiber hemp varieties at three NMSU ASC representing unique climatic areas throughout the state to evaluate the suitability of varities to each region

MEETING THE NEEDS OF NEW MEXICO

Identify varieties suitable for production in the state and identify potential market use for hemp outside CBD in grain/fiber capabilities

RESEARCH IMPACTS

Develop hemp variety recommendations for area hemp farmers; Identify markets for crop residues/wastes that are typically unused

ASSOCIATED LONG-TERM PROGRAM OF RESEARCH

Non-Hatch; Establishing Research Support and Recommendations for the NM Hemp Industry

ACES PILLAR

Food and Fiber Production and Marketing

NATIVE HABITAT ENHANCEMENT FOR IPM IN NEW MEXICO VINEYARDS

Investigators: Gill Giese, Miranda Kersten (PI)

PROJECT OVERVIEW

Conducted at NMSU ASC and privately-owned commercial vineyards to evaluate the effect of various cover crops/ground covers on native pollinator habitat enhancement.

MEETING THE NEEDS OF NEW MEXICO

Native pollinators and other beneficial insects provide important ecosystem services; but they suffer from habitat loss and degradation. Winegrowers need information to select and culture flowering plant cover crops that will support pollinators and soil health

RESEARCH IMPACTS

Demonstrate that flowering plants in previously unplanted, exposed vineyard row middles; enhance pollinator habitat, mitigate erosion, support soil health, and provide desirable consumer aesthetics and improve economic sustainability of wine growers in the arid southwest US.

ASSOCIATED LONG-TERM PROGRAM OF RESEARCH

Non-Hatch; Long-term pollinator habitat enhancement, soil health and vineyard productivity

ACES PILLAR

Environmental Stewardship and Conservation

FIELD EVALUATION AND MARKETABILITY OF 8 TABLE GRAPE VARIETIES FOR NM

Investigators: Gill Giese, Kevin Lombard

PROJECT OVERVIEW

9 rootstock entries (Vitis berlandieri, riparia or rupestris) and 2 Vitis vinifera winegrapes (Refosco and Gewurztraminer) entries were planted in 2008 and harvested in 2017 through 2021.

MEETING THE NEEDS OF NEW MEXICO

Cold-hardy, short season limited Vitis vinifera are impacted by rootstocks. Producers in northern New Mexico need information to select the best rootstock/cultivar combination for their circumstances.

RESEARCH IMPACTS

Wine grape production in non-traditional regions has relatively high return potential relative to many other crops when adding -value of processing (fermentation) and bottling.

ASSOCIATED LONG-TERM PROGRAM OF RESEARCH

Exploring alternative and speciality crops

ACES PILLAR

Food and Fiber Production and Marketing

COMMERCIAL DEACTIVATED YEAST PRODUCT EFFECT ON BERRY COMPOSITION OF SIX VITIS VINIFERA CULTIVARS IN SOUTHERN NEW MEXICO.

Investigators: Gill Giese

PROJECT OVERVIEW

Experiment at Fabian Garcia ASC with regional application, testing deactivated yeast as way of enhancing flavor, aroma and color of winegrapes grown in the southwestern US.

MEETING THE NEEDS OF NEW MEXICO

Winegrape value depends directly on wine quality judged by aroma, flavor and color appropriate to cultivar. Elevated temperatures of the SW United States at grape ripening can be detrimental to normal winegrape ripening.

RESEARCH IMPACTS

Commercial deactivated yeast applied to vine foliage in midseason can accelerate grape maturity and increase color and other characteristic flavor and aroma compounds associated with specific grape cultivars. Higher levels of these compounds in wine are associated with percieved increased value.

ASSOCIATED LONG-TERM PROGRAM OF RESEARCH

Non-Hatch; speciality crops in non-traditional production regions

NEW MEXICO'S 'HERITAGE' VARIETY: MISSION, ITS SUITABILITY AS A DEDICATED ROSE VARIETY

Investigators: Gill Giese

PROJECT OVERVIEW

The Spanish grape cultivar, 'Mission' was likely the first Vitis vinifera grape planted in North America documented in a planting near modern-day Socorro, New Mexico. It holds great potential when made and marketed as a dedicated rose varietal.

MEETING THE NEEDS OF NEW MEXICO

The 'Mission' grape lacks color, aroma and flavor as a red wine desired by modern consumers. However, it produces high per/acre yields, has desired anthocyanin profile as a light red, 'rose' wine with low to medium alcohol content, desired by the 21-35 year old demographic when marketed at an accessible price point, and as the first European winegrape in New Mexico's and US history.

RESEARCH IMPACTS

This scenario could prove an growing/marketing option for NM winegrowers and impart advantage in the lucrative rose wine market.

ASSOCIATED LONG-TERM PROGRAM OF RESEARCH

Non-Hatch; speciality crops in non-traditional production regions

FIELD EVALUATION OF 4 HYBRID WINEGRAPES

Investigators: Gill Giese

PROJECT OVERVIEW

4 hybrid cultivars were planted at the Los Lunas ASC in 2017 with the first harvest in 2021 and anticipated subsequent annual harvests.

MEETING THE NEEDS OF NEW MEXICO

Hybrid winegrapes offer resistance to the root louse phylloxera without grafting to rootstocks, greater cold-hardiness and yield per acre with comparable berry compostional quality.

RESEARCH IMPACTS

New Mexico winegrowers can reduce produciton costs and risks with adoption of proven hybrid cultivars.

ACES PILLAR

Food and Fiber Production and Marketing

SUSTAINABLE BIOECONOMY FOR ARID REGIONS: GUAR PRODUCTION

Investigators: John Idowu (PI), Mohammed Omer

PROJECT OVERVIEW

Guar is an alternative crops that is well adapted to the arid and semiarid climate. Guar is an annual legume that has low nutrient requirements compared to many other field crops. Therefore, guar is a potential alternative crop that producers in NM can grow to diversify their cropping systems for resiliency.

MEETING THE NEEDS OF NEW MEXICO

Crop production is under pressure in New Mexico due to increases in input prices and non-commensurate increases in product prices. For NM farmers to remain viable, there is a necessity to engage in the production of alternative crops such as guar. Guar can serve as an alternative industrial crop due to the guar gum that is extracted from guar beans. To optimize the yields of guar beans, agronomic trials were conducted in NM across different locations.

RESEARCH IMPACTS

Information on agronomic conditions necessary for growing guar is now available for different production regions of New Mexico. Growing guar in NM can help farmers diversify their cropping systems by producing high-value industrial crops, consequently improving their farm profit.

ASSOCIATED LONG-TERM PROGRAM OF RESEARCH

Non-Hatch – Alternative Crops for New Mexico

ACES PILLAR

Water Use & Conservation; Environmental Stewardship

GENOMICS-BREEDING FOR MACHINE HARVESTABLE CHILE PEPPERS IN NEW MEXICO

Investigators: Dennis N. Lozada (PI); Danise Coon

PROJECT OVERVIEW

Genome-wide association mapping was implemented to dissect the genetic basis of mechanical harvesting traits, including traits related to ideal plant architecture such as plant height, plant width, number of basal branches, and height to first bifurcation, in chile pepper. A diverse panel consisting of 105 Capsicum annuum lines was evaluated for these traits and genotyped using a genotyping-by-sequencing (GBS) approach.

MEETING THE NEEDS OF NEW MEXICO

Labor shortage and labor costs associated with manual harvesting affecting the total chile pepper production in the state.

RESEARCH IMPACTS

Single nucleotide polymorphism (SNP) markers derived from next-generation sequencing (NGS) were discovered and will be used for marker-assisted breeding and selection for machine harvestability traits in chile pepper.

ASSOCIATED LONG-TERM PROGRAM OF RESEARCH

Non-Hatch; Development of chile pepper cultivars amenable to machine-driven harvest

ACES PILLAR

Food and Fiber Production and Marketing

STATEWIDE ALFALFA VARIETY TESTING

Investigators: Mark Marsalis

PROJECT OVERVIEW

As part of a statewide program coordinated from the Tucumcari ASC, 15 entries were planted locally in 2018 to be harvested multiple times each year through 2023.

MEETING THE NEEDS OF NEW MEXICO

Alfalfa is New Mexico's #1 Cash Field Crop. Producers need information to select the best variety for their circumstances.

RESEARCH IMPACTS

Crop variety testing is an important statewide program in New Mexico. Crops tested include alfalfa, corn, sorghum, wheat, and cotton. University variety trials have shown that there is an average 25% higher yield associated with improved varieties, which translates into as much as $115M additional annual earnings statewide if superior crop varieties are selected over the trial mean.

ASSOCIATED LONG-TERM PROGRAM OF RESEARCH

Exploring Crop and Water-Conserving Alternatives for Sustaining the Forage Industries of New Mexico

ACES PILLAR

Water Use & Conservation; Food & Fiber Production and Marketing; Environmental Stewardship

SMOTHER CROPS FOR IMPROVING LAND PRODUCTIVITY AND FORAGE OPPORTUNITIES

Investigators: Mark Marsalis, Richard Strait

PROJECT OVERVIEW

Investigate various smother crop options (e.g., cowpea, corns, sorghums, millet, sunflower) alone or in combination for improving soil health parameters and forage production capability on sandy soils.

MEETING THE NEEDS OF NEW MEXICO

New Mexico soils are largely depleted of organic matter and nutrients necessary for sustainable and profitable crop production. Smother crops have the ability to improve overall soil health, and can be utilized for forage purposes.

RESEARCH IMPACTS

Finding a crop that provides a balance of soil-improving qualities and adequate forage yield and quality can maximize soil health efforts in the state, while giving producers an acceptable alternative for profitability.

ASSOCIATED LONG-TERM PROGRAM OF RESEARCH

Exploring Crop and Water-Conserving Alternatives for Sustaining the Forage Industries of New Mexico

ACES PILLAR

Water Use & Conservation; Food & Fiber Production and Marketing; Environmental Stewardship

PASTURE DEMONSTRATION ON TRIBAL LANDS

Investigators: Mark Marsalis, Jesse LeFevre, Gabrielle Rodriguez, and other CES agents

PROJECT OVERVIEW

Investigation of various species of improved and native grasses potentially adapted to the northern 2/3 of New Mexico, for improving grazing and haying systems.

MEETING THE NEEDS OF NEW MEXICO

The most appropriate pasture grass species have yet to be researched for adaptability, yield, and forage quality in northern New Mexico. Educational programs targeting irrigated forage production is lacking on Tribal lands.

RESEARCH IMPACTS

Finding forage crops that improve the yield and quality of grazing pastures in northern New Mexico (especially Native American tribal lands) will positively impact the livlihoods of producers on small- to medium-sized operations, thereby sustaining these communities.

ASSOCIATED LONG-TERM PROGRAM OF RESEARCH

Exploring Crop and Water-Conserving Alternatives for Sustaining the Forage Industries of New Mexico

ACES PILLAR

Water Use & Conservation; Food & Fiber Production and Marketing; Environmental Stewardship

ALLELOPATHIC COVER CROPS FOR PEST SUPPRESSION IN CHILE PEPPER IN THE SOUTHWEST

Investigators: B. Schutte (PI), E. Lehnhoff, S. Sanogo, R. Creamer, S. Bundy, R. Acharya

PROJECT OVERVIEW

This is a multi-year, multi-site evaluation of ecological techniques for suppressing weeds and soil-borne pathogens. Specifically, this project is evaluatiing winter cover crops for green manures that supporess pests in chile pepper.

MEETING THE NEEDS OF NEW MEXICO

Current management strategies are not effective against soil-borne diseases and early-season weeds that challenge chile pepper production. Accordingly, soil-borne diseases and early-season weeds reduce crop yields, increase production expenses, and increase the amount of synthetic pesticides used in chile pepper production.

RESEARCH IMPACTS

Increased yields and revenue for chile pepper producers in New Mexico. Reduced pesticide use in chile pepper production in New Mexico. Increased use of winter cover crops, which will enhance agroecosystem biodiversity and promote soil conservation across chile growing regions in New Mexico.

ASSOCIATED LONG-TERM PROGRAM OF RESEARCH

Non-Hatch. Reductions in weeds, soil-borne diseases, and management expenses in chile pepper production.

ACES PILLAR

Food & Fiber Production and Marketing; Environmental Stewardship; Foundational Education and Training

ENSURING SAFE AND SUSTAINABLE USE OF A NEW SOIL-APPLIED HERBICIDE FOR CHILE PEPPER PRODUCTION

Investigators: B. Schutte

PROJECT OVERVIEW

My previous research determined that flumioxazin is a promising new herbicide for controlling weeds in chile pepper. This project is evaluating flumioxazin for crop and food safety. Specifically, this research is determing if post-direct, row middle applications of flumioxazin result in chile fruits with residues that are greater than U.S. federal tolerances.

MEETING THE NEEDS OF NEW MEXICO

Although chile production requires near weed-free conditions for prolonged periods after planting, weed control in this crop is challenged by the relatively low number of registered herbicides. The low number of herbicides available for chile is caused, in part, by the limited economic incentive for companies to pursue product registrations in a crop that is considered minor nationally.

RESEARCH IMPACTS

In the short-term, this project will produce the information needed for registration of an effective and efficient weed control tool that is not currently available to chile pepper producers in New Mexico. Improved weed control will both reduce production expenses and increase crop yield. Thus, the medium-term impact of this project is enhanced profits for chile pepper producers. In the long-term, economic stability in chile pepper production will enhance the sustainability of the chile pepper industry in New Mexico.

ASSOCIATED LONG-TERM PROGRAM OF RESEARCH

Non-Hatch. Reductions in weeds, and management expenses in chile pepper production.

ACES PILLAR

Food & Fiber Production and Marketing; Foundational Education and Training

DEVELOPING PRACTICAL METHODS FOR REDUCING HAND HOEING REQUIREMENTS IN CHILE

Investigators: B. Schutte (PI), E. Lehnhoff

PROJECT OVERVIEW

The goal of this project is to develop two methods for reducing hand hoeing expenses in chile. To address this goal, we are determining weed, hoeing and yield responses to (1) a new use for the chile-registered herbicide 'pendimethalin', and (2) a mustard cover crop terminated at different times before chile seeding.

MEETING THE NEEDS OF NEW MEXICO

Chile pepper production in New Mexico is threatened by high costs for hand hoeing. The need for hand hoeing is partly a consequence of this crop's inability to rapidly establish competitive advantages over early-season weeds. This project is developing chemical and ecological strategies for controlling early-season weeds and reducing reliance on hand hoeing in chile pepper. Because the proposed methods utilize knowledge gained through our collaborations with chile farmers in New Mexico, this project will generate solutions that are likely to be implemented.

RESEARCH IMPACTS

Reduced reliance on hand hoeing in chile pepper, which will reduce production expenses and increase profits for farmers in New Mexico

ASSOCIATED LONG-TERM PROGRAM OF RESEARCH

Non-Hatch. Reductions in weeds, and management expenses in chile pepper production.

ACES PILLAR

Food & Fiber Production and Marketing; Foundational Education and Training

ESTABLISHING AND ENHANCING POLLINATOR HABITAT IN NORTHEASTERN NEW MEXICO

Investigators: Miranda Kersten, Amanda Skidmore

PROJECT OVERVIEW

Objectives were to demonstrate techniques to restore native plants in grasslands in northeastern New Mexico for pollinator habitat and weed control and create online resources for land managers in northeastern New Mexico on plant establishment techniques, pollinator habitat in rangelands, integrated pest management/integrated vegetation management using native plants, seed collection

MEETING THE NEEDS OF NEW MEXICO

Beneficial insects provide vital ecosystem services but existing habitat may lack necessary resources.

RESEARCH IMPACTS

By using commercially available plants and seed mixes, we developed a space that stakeholders can visit and see how they may apply to their own landscape. Using NWRs/public lands for this project has the added benefit of long-term maintenance and accessibility to the public.

ACES PILLAR

Environmental Stewardship

HONEY BEE HIVE VARIETY TRIAL

Investigators: Ge Zhang, Amanda Skidmore

PROJECT OVERVIEW

The main objective of this project is to determine if the beehive style has an impact on the health and productivity of honeybees

MEETING THE NEEDS OF NEW MEXICO

Local beekeepers have requested more information on honey production and honeybee pest management specific to the Southwest

RESEARCH IMPACTS

Pollen analysis will provide information on pesticide residues in honeybees active in the Albuquerque metro area and floral resource use.

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Environmental Stewardship; Food & Fiber Production and Marketing

UNDERCOVER TOMATOES – MANAGING STRESS, PESTS, AND DISEASE

Investigators: Marisa Thompson (PI), Charles Havlik, Stephanie Walker, Dawn Vanleeuwen

PROJECT OVERVIEW

Tomato-related problems are among the topmost commonly fielded questions from the public. Results from this study on strategies for supplying shade and avoiding death-by-disease may increase the productivity and sustainability of this wildly popular crop. As Dr. Ivette Guzman says, "Tomatoes are a gateway vegetable." Studies like these can be used to grab public attention, share sustainable methods, and, ultimately, improve agricultural literacy in the urban sector. This project aims to increase knowledge and agricultural literacy of sustainable growing practices, including the development of IPM strategies for BCTV control. In the summers of 2020 and 2021, 'Big Beef' hybrid tomato plants were either 1) coated with a kaolin clay film, 2) grown under shade cloth, or 3) grown under the open skies (control). Using a cadre of eager volunteers, data was collected on plant size and survival rates, plant water status and photosynthetic rates, and tomato yields.

MEETING THE NEEDS OF NEW MEXICO

Heat, water, and disease stressors are among the biggest hurdles for commercial and backyard tomato growers in the southwestern US. Beet curly top virus (BCTV) is an all too familiar problem affecting multiple crops in New Mexico and other semiarid regions of the world. Shade cloth may help growers overcome those hurdles by either protecting plants from the tiny, jumping insect vector that spreads BCTV (tiny, as in a skinny grain of rice) or reducing sun and heat stress on the plants and thereby reducing water requirements.

RESEARCH IMPACTS

In 2021, 20+ volunteers helped grow (and weed) 153 tomato plants, totaling 350+ hours of volunteer service and over $4,100 in equivalent wages. Volunteers harvested, weighed, counted, and graded a total of 5,444 lbs of tomatoes from a final total of 86 live plants grown under full-sun, shade cloth, or sprayed with kaolin clay. Volunteers shared fresh tomatoes with families, neighbors, and dropped off boxfuls at local food banks. Volunteers (average age >70) reported that they enjoyed the outdoor work and learning about the NMSU ASC system, research methods, beneficial & pest insects, and common tomato diseases.

ACES PILLAR

Food & Fiber Production and Marketing; Water Use and Conservation; Environmental Stewardship

EFFECTS OF URBAN LANDSCAPE GROUND COVERS ON SOIL MOISTURE & TEMPERATURE, WEED CONTROL, AND TREE ESTABLISHMENT

Investigators: Marisa Thompson

PROJECT OVERVIEW

Research has confirmed the benefits of fibrous, woody mulch on soil moisture retention, weed control, soil health, plant health (root establishment, reduced water stress) in other regions. Until now, this work has not been done on the landscape scale in New Mexico. In September 2019, with input from arboriculture researchers from the d

MEETING THE NEEDS OF NEW MEXICO

In our semi-arid climate, soils are exposed to extreme temperatures, minimal precipitation, and high winds. Protecting those soils is imperative to maintain soil and plant health. For this study, we are investigating the impact of different mulch treatments on tree and soil health. Encouraging the use of cultural practices that improve soil health and water retention is imperative to maintaining healthy plants, which in turn minimizes pest populations. In other regions, research has confirmed the benefits of fibrous, woody mulch on IPM-related horticultural issues (e.g., weedy species control and improving soil health by encouraging beneficial organisms), but this work has not been done on the landscape scale in New Mexico soils.

RESEARCH IMPACTS

1) Compare tree, weed, and soil responses to three treatments: woodchip mulch, rock mulch, and bare ground.
2) With additional research, develop recommendations for increased sustainability of landscape practices in New Mexico.
3) Demonstrate research practices using scientific measurement devices, data sharing, and implementation of IPM techniques in the public Learning Garden at the NMSU Agricultural Science Center at Los Lunas.

ACES PILLAR

Water Use and Conservation; Environmental Stewardship

MECHANICAL HARVEST TRIALS FOR NM GREEN CHILE

Investigators: Stephanie Walker

PROJECT OVERVIEW

Evaluation of breeding lines in development and commercial NM green chile accessions for mechanical harvest efficiency.

MEETING THE NEEDS OF NEW MEXICO

NM green chile is completley hand harvested leaving us at competative disadvantage with competing countiries & chile growers struggle with inadequate labor to harvest their crops.

RESEARCH IMPACTS

Maintaining and increasing NM's vibrant chile processing industry.

ACES PILLAR

Food & Fiber Production and Marketing

BREEDING PEPPERS FOR MECHANICAL HARVESTING

Investigators: Franchesca Ortega, Brad Tonnessen, Stephanie Walker

PROJECT OVERVIEW

Breeding to incorporate easy destemming trait into NM type green chile accessions; identification of easy destemming molecular markers to speed up breeding process.

MEETING THE NEEDS OF NEW MEXICO

Lack of destemming (easy pedicel removal) remains the last serious roadblock to mechanical harvest of NM green chile. Incorporation of easy destemming trait may allow for pedicels left on plant during mechanical harvest.

RESEARCH IMPACTS

Maintaining and increasing NM's vibrant chile processing industry.

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Food & Fiber Production and Marketing

DEVELOPMENT OF IMPROVED CHILE CULTIVARS FOR NEW MEXICO GROWERS

Investigators: Stephanie Walker, Dennis Lozada

PROJECT OVERVIEW

Evaluate advanced breeding lines of improved 'NM 6-4' improved for fruit size and ASTA

MEETING THE NEEDS OF NEW MEXICO

'NM 6-4' is an heirloom chile variety that continues to be popular, but has smaller than desireable fruit size and extractable pigment (ASTA).

RESEARCH IMPACTS

Release of new improved chile cultivars to support local producers.

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Food & Fiber Production and Marketing

INITIATION OF THE NEW MEXICO PARTICIPATORY PLANT BREEDING PROGRAM

Investigators: Brad Tonnessen, Charles Havlik, Stephanie Walker

PROJECT OVERVIEW

Collaborative efforts with NM growers to identify and further improve vegetable varieties through traditional breeding and selective seed saving.

MEETING THE NEEDS OF NEW MEXICO

Most available vegetable varieties were not developed for or are not well-adapted to NM growing conditions.

RESEARCH IMPACTS

Development of vegetable varieties with improved performance to enhance farm profitabilty.

ACES PILLAR

Food & Fiber Production and Marketing

'NUMEX ODYSSEY' SEED INCREASE

Investigators: Stephanie Walker

PROJECT OVERVIEW

A seed increase was conducted in an isolated field to produce breeder seed for the new mechanical harvest efficient NM green chile cultivar release.

MEETING THE NEEDS OF NEW MEXICO

Release of new mechanical harvest efficient NM green chile cultivar, a critical component towards mechanizing commercial production.

RESEARCH IMPACTS

Commercial utilization of 'NuMex Odyssey'.

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Food and Fiber Production and Marketing

JUJUBE CULTIVAR TRIALS AND MARKETING

Investigators: Shengrui Yao (PI), Chaddy Robinson, Steve Guldan and Gill Giese

PROJECT OVERVIEW

Jujube cultivar trials was set up in 2015 at NMSU Los Lunas Center as one of the three cultivar trial sites in New Mexico. We will observe their performance and collect data for 10 years.

MEETING THE NEEDS OF NEW MEXICO

With severe late frosts each year, most tree fruit species do not have reliable crops. While, jujube is a new crop with limited cultivars available but produces annually in New Mexico. Growers and home gardeners would like to have more cultivars for difference purposes. NMSU Alcalde Center imported over 30 cultivars in 2011 and set up cultivar trials at different locations to observe their performance and recommend top-performers to growers.

RESEARCH IMPACTS

Jujube produces reliable crop in New Mexico with nutritious fruit. Its cultural management is realtively simple with minimal pruning and limited or no pest problems. It is a great fruit crop in New Mexico especially in central and southern New Mexico. Once the newer cultivars are adopted, it will increase the growers' revenue and maintain the sustainability of their operation in New Mexico and the Southwest.

ASSOCIATED LONG-TERM PROGRAM OF RESEARCH

Part of Shengrui Yao's hatch research program. Sustainable fruit production in northern New Mexico.

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Food and Fiber Production and Marketing

Outreach Activities

Due to the ongoing COVID-19 pandemic, many events hosted by Los Lunas ASC faculty and staff were conducted virtually through various online platforms. Some in-person events were conducted following university COVID protocol guidelines.

- Field Day/Open House – August 18, 2021
- Quince Harvest Workshop – November 13, 2021
- Tour of the ASC for Sites Southwest Landscape Architects – May 28, 2021
- El Jardin Encanto Garden Club – Met monthly at ASC; multiple presentations to this group
- Hosted Seed2Harvest working group – October 26, 2021
- Ready, Set, GROW! Series – Monthly virtual webinars
- Volunteers worked weekly with the Horticulture Specialist assisting with tomato research and Learning Garden activities.
- Master Gardeners assisted with planting 8 table grape varieties at the station
- All faculty assisted in hosting and recording virtual pesticide applicator training modules for 2021 license holders, in conjunction with on-campus faculty and staff.
- All faculty presented at various in-person workshops, field days, and CEU training across the state.
- Live Webinars and Presentations: 42 Horticulture Topics (Thompson)
- Conserving and Creating Pollinator Habitat Online Workshop Series – 6 online events in April 2021
- Hemp Coffee Hour – Online Workshops - 9 events from February to May 2021.
- Faculty and staff responded to hundreds of stakeholder requests for information in 2021 via phone calls, emails, office walk-ins, and site visits, including from surrounding states and internationally.

Research Publications:

Giese, W. G., Saldaña Zepeda, D.P., Beacham, J., and C. Velasco-Cruz. 2021. MODELING NEMATODE POPULATION DYNAMICS USING A MULTIVARIATE POISSON MODEL WITH SPIKE AND SLAB VARIABLE SELECTION. Journal of Applied Statistics https://www.tandfonline.com/action/journalInformation?show=aimsScope&journalCode=cjas20

Thompson, M. Y., Randall, J. J., VanLeeuwen, D., Heerema, R. 2021. Differential Expression of Key Floral Initiation Genes in Response to Plant Growth Regulator Application and Alternate Bearing in Pecan. HortScience. 146: 206-214. https://doi.org/10.21273/JASHS04954-20

Thapa, V.R., R. Ghimire, and M.A. Marsalis. 2021. Cover Crops for Resilience of a Limited-Irrigation Winter Wheat-Sorghum-Fallow Rotation: Soil Carbon, Nitrogen, and Sorghum Yield Responses. Agronomy 2021, 11, 762. https://doi.org/10.3390/agronomy11040762.

Djaman, K., M. O'Neill, L. Lauriault, M. Marsalis, K. Koudahe, M.K. Darapuneni. 2021. The Dynamics of Forage Yield of Different Fall Dormancy Rating Alfalfa Cultivars in a Semiarid Climate. Agric. Res. doi.org/10.1007/s40003-020-00518-8.

Thapa, V.R., R. Ghimire, V. Acosta-Martinez, M.A. Marsalis, and M. Schipanski. 2021. Cover Crop Biomass and Species Composition Affect Soil Microbial Community Structure and Enzyme Activities in Semiarid Cropping Systems. Applied Soil Ecology. 157: doi.org/10.1016/j.apsoil.2020.103735.

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Marsalis, M.A., R.P. Flynn, L.M. Lauriault, A. Mesbah, and K. Djaman. 2021. New Mexico 2020 Corn and Sorghum Performance Tests. https://aces.nmsu.edu/pubs/variety_trials/welcome.html. February 2021.

Lauriault, L.M., M.A. Marsalis, S.H. Cox, and G.C. Duff. 2021. Seasonal yield and animal preference for irrigated winter cereal forage under continuous stocking in a semiarid, subtropical region. 2021. *In Proceedings*, Western Alfalfa & Forage Symposium. November 14-17, 2021. Reno, NV.

Extension Publications:

Giese, W. G. (2021). In Frank Sholedice (Ed.), Guide H-311, Improving Size and Quality of Seedless Grapes (ed., pp. 4). Las Cruces, NM: NMSU CES. https://aces.nmsu.edu/pubs/_h/H311.pdf

Beck, L., Giese, W. G. (2021). Guide H-334, Managing Weeds in Grapes in New Mexico (ed.). Las Cruces NM: NMSU CES.

Integrated Pest Management (IPM) Strategies for Common Garden Insect Pests of New Mexico, Guide H-176. Alissa J. Freeman, Miranda L. Kersten, Amanda Skidmore, and Marisa Y. Thompson https://aces.nmsu.edu/pubs/_h/H176/welcome.html

Trees and Shrubs for Beneficial Insects in Central New Mexico, Guide H-177. Miranda L. Kersten, Alissa J. Freeman, Amanda R. Skidmore, and Marisa Y. Thompson https://aces.nmsu.edu/pubs/_h/H177/welcome.html

Trees and Shrubs of New Mexico Junior College, Hobbs, NM, Guide H-179. Jason Fechner, Miranda L. Kersten, Amanda Skidmore, and Marisa Y. Thompson https://aces.nmsu.edu/pubs/_h/H179/welcome.html
Trees and Shrubs of St. John's College, Santa Fe, NM, Guide H-178 Jason Fechner, Miranda L. Kersten, Jeff Clark, and Amanda Skidmore https://aces.nmsu.edu/pubs/_h/H178/welcome.html

Integrated Pest Management (IPM) Strategies for Common Garden Insect Pests of New Mexico, Guide H-176. Alissa J. Freeman, Miranda L. Kersten, Amanda Skidmore, and Marisa Y. Thompson https://aces.nmsu.edu/pubs/_h/H176/welcome.html

Turner, J.L., M.A. Marsalis, and R. Creamer. 2021. Potential Poisoning of Horses Consuming Sorghum, Sudangrass, and Sorghum-Sudangrass Hybrid Forages. NMSU Cooperative Extension Service Publication. Las Cruces, NM. Guide B-720. March 2021.

Marsalis, M. 2021. Crop Considerations for Reduced Water Situations in the Middle Rio Grande Region - 2021 'News You Can Use' Extension Factsheet. March 12, 2021.

Faculty and Staff

Mark Marsalis, Ph.D.	Interim Superintendent, Extension Forage Specialist
William "Gill" Giese, Ph.D.	Extension Viticulture Specialist
Marisa Thompson, Ph.D.	Extension Urban Horticulture Specialist
Amanda Skidmore, Ph.D.	Extension Integrated Pest Mgmt Specialist (position now vacant)
Charles Havlik, Ph.D.	Senior Research Assistant
Ashley Knoch	Research Assistant Inter.
Ge Zhang, Ph.D.	Post-Doc
Melissa Schreiner	Research Assistant Inter.
Miranda Kersten	Program Manager, IPM
Michael "Tom" Place	Farm Ranch Manager (retired)
Ryan Garcia	Farm Ranch Manager
Dennis Price	Assistant Farm Manager
Candace Salazar	Administrative Assistant – Associate
Cathy Casaus	Fiscal Assistant – Inter.
Jose Gonzalez	Laborer - Sr.
Max Perea	Laborer - Sr.
Jolene Wulf	Laborer – Sr. (position now vacant)
Carol Bennefield	Ag Science Laborer
Alex Marsalis	Ag Science Laborer
Andreas Perea	Ag Science Laborer
Benjamin Scott	Ag Science Laborer
Mellene Pablo	Student Aide
Tyra Trumble	Student Aide
Gloriana Yee	Student Aide
Isabella Salazar	Intern

2021 Advisory Committee

- Eugene Abeita
- Dan Kloss
- Matthew Aragon
- Mike Lundmark
- Karen Barela
- Mathew Chavez
- Bryan Suhr
- Mike Conant
- Lin Yeskie
- Harvey Crowley
- Zena Kinne

Cooperators and Collaborators

Industry and Tribal

ADAMA Inc.
Amaro, Lescombes, and Noisy Water Wineries
Arizona Community Tree Council
BASF
Black Smuggler Winery
Bridgestone Americas Inc.
City of Albuquerque – Bio Park
City of Albuquerque – Open Space Patrol Volunteer Training Program
City of Las Cruces – Tree Stewards Training Program
Curry Chile & Seed Co.
Diam Cork Closures
Double-A Nursery
Duarte Nursery
Guar Resources, TX
Jaramillo Vineyards
Jicarilla Nation
Lescombes Vineyard
National Grape Research Alliance
NM Chile Association
NM Farmer's Markets
NM Hay Association
NM Wine Growers Association
Ohkay Owingeh Pueblo
Olam Foods
Pueblo of Santa Ana and Tamaya Resort Inc.
Santa Ana Pueblo Farms & Santa Ana Pueblo Native Plant Nursery
Santa Ana Pueblo Vineyard, Sandoval County
Stahmann's Inc.
Think Trees NM
Tree New Mexico ABC Tree Stewards Training Program
Western Sustainable Agriculture Research and Education (WSARE)
Whole Foods Market, Durango CO, and Farmington
Wine Cartel Inc. (winery consultants, Mr. Michael Dominguez), Mr. Michael Leonardelli, climatologist
Wines of the San Juan, Blanco, NM

Collaborating NMSU Faculty

Dr. Leslie Beck (Extension Plant Sciences) – Weed control in alfalfa
Dr. Catherine Brewer (Chemical and Materials Engineering) – Hemp varieties
Dr. John Idowu (Extension Plant Sciences) – Guar production
Dr. Dennis Lozada (Plant & Environmental Sciences) – Chile breeding
Dr. Brian Schutte (Entomology, Plant Pathology, & Weed Science) – Weed control in chile
Dr. Stephanie Walker (Extension Plant Sciences) – Chile varieties and harvest mechanization
Dr. Shengrui Yao (Plant & Environmental Sciences; Alcalde ASC) – Jujube varieties

NMSU, University, State, and Federal

NMSU Alcalde Science Center
NMSU Artesia Science Center
NMSU Clovis Science Center
NMSU Fabian Garcia Science Center
NMSU Farmington Science Center
NMSU Leyendecker Science Center
NMSU Mora Science Center
NMSU Tucumcari Science Center
NMSU Extension Master Gardeners
NMSU Pesticide Safety Education Program
NMSU Plant Diagnostic Clinic
NM Cooperative Extension Service
NM State Forestry
NM Urban Forest Council
Valencia County Cooperative Extension
University of Arizona
AZ Cooperative Extension Service
Colorado State University
USDA Natural Resource Conservation Service
USFWS Northern New Mexico National Wildlife Refuge Complex

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