



College of Agricultural, Consumer, and Environmental Sciences

Department of Plant and Environmental Sciences Profile

<https://pes.nmsu.edu> • (575) 646 - 3405

Quick Facts

- The Plant and Environmental Sciences (PES) Department has experienced and internationally recognized faculty with varied specialties, including plant breeding, biotechnology, agronomy and horticulture, ornamental plant production and floriculture, landscape design, turfgrass management, sustainable and organic crop production, forestry and soil remediation, soil ecology and soil science. We are committed to providing an outstanding education through classroom and individualized instruction, as well as through hands-on, real-world learning via internships, externships, experiential class projects and research experiences in the department.
- Over the past five years, PES Faculty have published more than 400 books, chapters, and referred journal articles!
- The Department is home to many research and outreach programs, such as the alfalfa, chile, cotton, and onion breeding programs; the office of the state Climatologist; and the NSF-funded Jornada Basin Long-Term Ecological Research Program.
- PES's award winning faculty have received 67 academic awards and 17 service awards, released more than 120 cultivars, and have been awarded over 7 patents. The department has one Regent Professor. Over the last five years, faculty have attracted more than \$50 million in external grants and contracts.



Mission Statement

The PES mission is to improve the quality of life for the citizens of New Mexico, the United States and globally, through teaching, research, outreach, and service in the study and application of plant and environmental sciences relevant to agriculture, food and fiber production and environmental sustainability.

Selected Program Impacts

- **Water Efficient, low input, adaptable, and alternative crops to diversify cropping systems in the Southern High Plains.**
The Ogalla Aquifer, the major irrigation resource for the Great Plains, is declining rapidly. If current use of the aquifer continues, more than 35% of irrigated acreage producing \$2.5 Billion worth of agricultural products will be dryland farming in less than two decades. Our research on alternative crops like winter canola, safflower, and guar is developing rotational cropping systems that require less irrigation and are more economically viable, resource efficient, and climate resilient.
- **Genetic Improvement of Chile Pepper (Capsicum) Germplasm for New Mexico.** Breeding new, higher yielding, pest and disease resistant, heat and drought tolerant chile pepper cultivars will preserve New Mexico's heritage and ensure economic development. In New Mexico, chile pepper processing is a nearly \$500 million industry. Chile wilt caused by *Phytophthora capsici* and *Verticillium dahliae* can destroy entire fields. Resistant cultivars, which do not add cost to the seed, are arguably the best way to manage disease. For the plant breeder, finding molecular markers linked to resistance genes can obviate the need for testing to identify resistant individuals from early generations, leading to an effective breeding procedure. The increase of efficiency can reduce the time needed for a breeding program by years, saving thousands of dollars. In recent years, our program has published a molecular marker for verticillium wilt resistance that has been used by seed companies worldwide.

ACES Pillars for Economic and Community Development

Food and Fiber Production and Marketing

Water Use and Conservation

Family Development and Health of New Mexicans

Environmental Stewardship

Foundational Education and Training

New Mexico State University

Selected Program Impacts (cont.)

- **Ecological Studies contribute to the management of SW USA rangelands and to the sustainability of arid and semi-arid ecosystems worldwide.** The grasslands and shrublands of the Southwest United States are a vital part of the regions economy and culture, and such ecosystems support meat and milk production for upwards of 4 billion people worldwide. NMSU scientists are using multiple approaches, including field studies, remote sensing, and modeling to understand how changing management and weather patterns impact the productivity and sustainability of grasslands subject to shrub encroachment, loss of grazing resources, and declining productivity.
- **Genetically engineered alfalfa that is high yielding and possesses high forage quality.** Transgenic alfalfa plants containing a maize gene encoding for a key enzyme in carbon metabolism have been produced. These alfalfa plants exhibit a twofold increase in growth rates, creating additional cuttings, greater biomass, and a positive economic impact. These plants have high protein content and reduced fiber - desirable traits for dairy farmers. The plants also have more and larger root nodules, which leads to increased nitrogen transfer from the atmosphere to the soil.

Selected Partnerships and Collaborations:

PES faculty work closely with numerous County, State and Federal Agencies, including:

- City and County administration
- New Mexico State Department of Agriculture
- NM Environment Division

Federal Management Agencies include:

- Bureau of Land Management
- National Forest Service
- USDA-Agricultural Research Service
- Other agencies

Faculty and Areas of Expertise**Agronomy and Soils**

Sangamesh Angadi, crop physiology
Colby Brungard, pedology
Kenneth C. Carroll, water supply, environmental remediation, chemical fate
Murali Darapuneni, semi-arid cropping systems
Koffi Djaman, soil and water resources, irrigation engineering
Rajan Ghimire, soil quality, soil fertility, conservation systems
Kulbhushan Grover, agroecology, sustainable crop production
John Idowu, extension agronomist; agronomy and land management
Xiufen (Sophia) Li, soil microbiology, soil health, soil fertility
Mark Marsalis, extension agronomist; forage agronomy
Srinivasa Rao Pinnamaneni (Sri), resilient cropping systems
Richard Pratt, cropping systems research and outreach, cover crops
Naveen Puppala, peanut breeding and variety development
Saeid Zehtab Salmasi, sustainable crop production, medicinal plants
Blair Stringam, biological and agricultural engineering
April Ulery, soil chemistry, soil mineralogy, phytoremediation, soil quality
Tiantian Zhou, soil physics, hydrological processes, transport modeling

Environmental Science

Owen Burney, silviculture and forest biology
Kenneth C Carroll, water supply, environmental remediation, chemical fate
Maria Chavez, ecology and agroecology
David Dubois, state climatologist; atmospheric science
Brandon Edwards, geomorphology, aeolian processes, hydrology
Rajan Ghimire, soil quality, soil fertility, conservation systems
Niall Hanan, dryland ecology, remote sensing, modeling
Omar Holguin, biochemical analysis
Jennifer Peters, plant hydraulics, environmental stressors, forest ecophysiology
Caitriana Steele, climate change on agriculture, rangelands, and forests
Blair Stringam, biological and agricultural engineering
April Ulery, soil chemistry, soil mineralogy, phytoremediation, soil quality
Tiantian Zhou, soil physics, hydrological processes, transport modeling

Genetics and Biotechnology

Mohammad Abdullah Al Bari, alfalfa breeding, genetics, and genomics
Chris Cramer, plant breeding, quantitative genetics, crop production
Paulo Izquierdo, quantitative genetics, QTL mapping, genomic prediction
Dennis Lozada, genomic selection, marker assisted breeding, chile breeding
Richard Pratt, cropping systems research and outreach, cover crops
Naveen Puppala, peanut breeding and variety development

Horticulture and Turf Science Management

Chris Cramer, plant breeding, quantitative genetics, crop production
Ryan Goss, turfgrass science and management
Ivette Guzman, organic horticulture and functional foods
Richard Heerema, extension horticulturist; pecan specialist
Israel Joukhadar, controlled environment agriculture and crop production
Bernhard Leinauer, turfgrass specialist
Kevin Lombard, horticulture
Dennis Lozada, genomic selection, marker assisted breeding, chile breeding
Geraldine Diverres Naranjo, extension viticulture specialist
Marisa Thompson, extension urban horticulture specialist
Stephanie Walker, extension vegetable specialist
Shengrui Yao, extension fruit specialist; pomology

The College of Agricultural, Consumer, and Environmental Sciences is an engine for economic and community development in New Mexico, improving the lives of New Mexicans through academics, research, and extension programs. New Mexico State University is an affirmative action/equal opportunity employer and educator. NMSU and the U.S. Department of Agriculture cooperating.