



College of Agriculture  
and Natural Resources  
Wyoming Agricultural  
Experiment Station

# Wyoming Agricultural Experiment Station 2020 SELECTED RESEARCH IMPACTS

## WAES—Who We Are

For over 125 years the Wyoming Agricultural Experiment Station has been providing support for fundamental and applied research on agricultural, natural, and community resource issues related to the needs of Wyoming, the region, the nation, and the world. WAES operates four Research and Extension Centers located in Laramie, Powell, Sheridan, and Lingle. As the research branch of the University of Wyoming College of Agriculture and Natural Resources, WAES funds and actively promotes research with emphasis on areas identified through stakeholder input and national priorities. The following impacts represent a small sample of the research we support. Learn more at [www.uwyo.edu/uwexpstn](http://www.uwyo.edu/uwexpstn).



### Russian olive biological control

A University of Wyoming entomologist, along with collaborators from Canada and Switzerland, has been working to facilitate biological control of Russian olive, an invasive tree from southeastern Europe and Asia that has proliferated widely across the inland West displacing native species. Russian olive has spread from intentional plantings—windbreaks and suburban yards—to river bottoms and pastures, where it impacts native plants, birds and insects, reduces recreational access to water, and limits livestock grazing. Biological control, one of the cornerstones of invasive weed management, involves importing natural enemies from a weed's native range. Investigators are seeking to import an Eastern European natural enemy of Russian olive—the mite *Aceria angustifoliae*, which forms galls on the tree's flower buds and developing seeds. To this end, the investigators compiled information on the biology of the mite and Russian olive, and submitted documentation to the U.S. Department of Agriculture to inform and help guide the approval process. Reviewers with USDA have recommended that the mite be approved for importation, and after completion of the permitting process, the investigators expect that *Aceria angustifoliae* will become a valuable tool to prevent the spread and impact of Russian olive.

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### Subclinical mastitis and production efficiency

Increasing global demand for livestock products is occurring at the same time livestock production is being threatened by urbanization, drought conditions, variable markets, and policy pressures, as well as the effects of animal disease. Research at the University of Wyoming, Montana State University, and the United States Sheep Experiment Station, estimates the incidence of subclinical mastitis (inflammation of the mammary gland) in sheep to be between 11% and 74% of ewes—much greater than previously thought. A decrease in lamb performance of up to 35 pounds per litter when reared by ewes with subclinical mastitis was also shown, representing an economic loss of up to \$106 per ewe. Ongoing research at the University of Wyoming has discovered that the microbial ecology of the mammary gland throughout lactation is an important factor for understanding this disease and follow-up investigations of these microbial communities seek to identify the extent and duration of the negative impacts on lamb performance.

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### Narrow rows may improve dry bean yields

University of Wyoming crop researchers in Wyoming's Bighorn Basin routinely seek new management practices to help increase producer profits. In a three-year dry bean project examining seeding rates, we identified a management practice that could improve producer profit. Typically, producers in this region grow their dry bean crop in 22-inch rows and plant about 100,000 seeds per acre. In this study, multiple bean varieties were tested at seeding rates of 50,000 to 120,000 seeds per acre. Each variety was also grown in 7-inch rows as well as the standard 22-inch rows, and at three different irrigation rates. Not surprisingly, narrow rows consistently outyielded wider rows independent of irrigation rate. A surprising finding, however, was that seeding rates at 50,000, or sometimes even lower, showed yields that were competitive with yields from the higher seeding rates. These results suggest that narrow rows combined with a modest seeding rate may help producers reduce seed costs with little or no loss in yield.

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### Peer educators teach relationship workshops

Romantic relationships have a significant impact on individual well-being and family stability. A concerning trend is that both perpetration and victimization of relationship violence peak during emerging adulthood. Prevention approaches aim to reduce negative attitudes and behaviors before they become established patterns in young adults. The majority of young adults are unmarried with the average age of marriage now 29 for men and 27 for women. Educating young adults (18-25) is important for preventing negative patterns in committed relationships and eventually marriages. During 2018-2020, undergraduate social science students enrolled in a service-learning course called Relationship Education and Leadership. These students were trained as peer educators to provide educational content about romantic relationships. Seventeen undergraduate peer educators taught a four-session workshop series to 102 University of Wyoming students. Pre- and post-program surveys indicated that the participants' knowledge of relationship topics improved from before to after the program. For instance, participants had improved knowledge of healthy communication, greater awareness of warning signs of abuse, and increased understanding of how family background can influence romantic relationships. Participants reported high satisfaction with the program with 85% reporting high satisfaction, 82% stating they would recommend it to a friend, and 67% reported that the program exceeded their expectations.

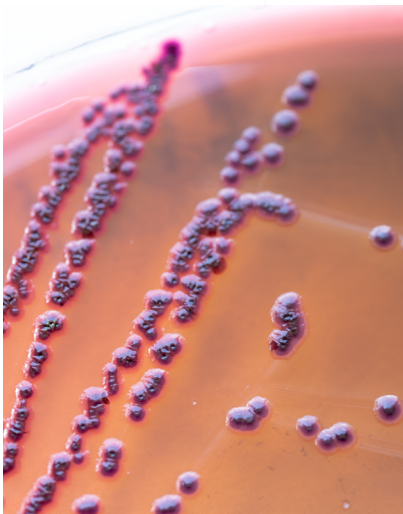
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### Soil amendment impact on urban garden soils

The cultural, ecological, and health benefits of gardening are well-documented, and gardens are especially important in urban areas, where gardening can play a critical role in food access and community-building. However, these benefits must be balanced with increased risk of exposure to pollutants that are common in city spaces, especially toxic heavy metals. This project examined the concentration of the heavy metals lead and cadmium in 25 urban gardens in Laramie, Wyoming, along with how soil amendments influence the bioavailability of these heavy metals. The levels of lead and cadmium observed do not pose significant health risks to humans or crops, although significant differences in available cadmium based on historical land use were evident, with agricultural/rangeland soils containing greater amounts of available cadmium than residential- or community-gardens. This pattern may be due to repeated additions of soil amendments in residential and community gardens, which are known to lower soil pH, and in turn, reduce soil cadmium availability. However, high soil lead concentrations may not be alleviated by adding soil amendments; instead, soil lead availability and plant uptake may be enhanced. Finally, low gardener awareness of potential soil contamination indicates the need for improved community outreach and more robust soil testing.

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### Detecting pathogens to reduce foodborne illness

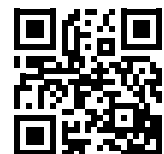
Major foodborne pathogens cause 9.4 million illnesses, 56,000 hospitalizations, and 1,400 deaths in the U.S. each year. The annual cost of foodborne illness is estimated to be a staggering \$15.6 billion. Our goal is to reduce the burden of foodborne illness by improving our understanding of the persistence, resistance, and dissemination of foodborne pathogens in natural environments (including wildlife), food animals, and food processing facilities. To further this goal, we are seeking to improve diagnostics of foodborne pathogens as well as bacteria that indicate the presence of pathogens. Through collaborative efforts, our lab has developed a method to predict types of antimicrobial resistance as well as host sources of *Escherichia coli* based on differential fatty acid abundance. For example, following linear regression analysis of fatty acid abundance, resistance to the important fluoroquinolone antimicrobials nalidixic acid and ciprofloxacin could be predicted with 79% and 81% accuracy, respectively. The host source was predicted with 63% accuracy. Improved detection methods will benefit producers and regulatory agencies in developing mitigation strategies to reduce the threat of dissemination of foodborne pathogens and antimicrobial resistant bacteria.

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### WYOMING AGRICULTURAL EXPERIMENT STATION

To view past impact summaries and the WAES research database, visit [www.uwyo.edu/uwexpstn/research-results-impacts](http://www.uwyo.edu/uwexpstn/research-results-impacts).

Contact (307) 766-3667 or [aes@uwyo.edu](mailto:aes@uwyo.edu) to learn more about these research projects and other WAES programs.



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