

## Reasons why FRRL Scientists are doing their research

### Monaco

Invasive plants alter ecosystem properties and seriously compromise agricultural potential of the Great Basin. The FRRL is studying why invasive plants are spreading to develop new strategies to preserve agricultural productivity and ecosystem integrity. Strategies seek to utilize improved plant materials to change wildfire frequency and rebuild critical soil functions.

### Staub

Natural resources such as water will become much more limiting in semi-arid regions of the world. The FRRL is developing drought and heat resistant fine-leaved grasses for such growing environments. These plant materials will be used to decrease water use reduce fire frequency in urban rangeland interfaces.

### Jones

Native grass plant materials are needed to facilitate restoration and rehabilitation of Intermountain rangelands, but currently available plant materials may be difficult to establish. The FRRL has recently developed 'Continental' basin wildrye and 'Discovery' Snake River wheatgrass, which feature improved establishment. Increased establishment success of native grasses on western rangelands will benefit the health of livestock, wildlife, and the land itself.

### Johnson

North American legumes are important components of rangeland ecosystems; however, cultivars of these legumes are seriously lacking for use on rangelands in the western U.S. The FRRL is actively involved in the collection, evaluation, and release of basalt milkvetch, western prairie clover, and Searls' prairie clover for use on western rangelands. These North American legumes will aid in revegetating degraded rangelands, reducing the frequency of wildfires, combating weed invasion, and maintaining ecosystem integrity.

### Wang

Characterization of plant genomes is essential for determining species relationships. FRRL scientists are using novel cytogenetic (chromosome) and molecular (DNA) techniques for plant and genome characterization. Such characterizations will enable the localization and identification of desirable genes for developing more efficient ways to improve plants.

### Peel

Productivity of western U.S. rangelands can be improved by including a legume when reseeding after disturbances (e.g., wildfire and grazing). Legumes fix atmospheric nitrogen which can be utilized by grasses and other plants for improved growth. The FRRL has developed persistent "falcate" alfalfa types for use on range and pasturelands that increase rangeland productivity. Other legumes under development for this purpose include sainfoin, cicer milkvetch, unique alfalfas, and birdsfoot trefoil.

### Mott

Many turf, range, and pasture grasses in the western U.S., especially species of the *Elymus* genus, are susceptible to feeding and larval damage from the bluegrass billbug. The FRRL is evaluating plant materials for billbug preference and resistance. These efforts will lead to discovery of *Elymus* chromosome regions that affect billbug susceptibility as well as plants with natural resistance to billbug damage.

### Bushman

Many pasture and turf grasses suffer from intolerance to salt, which can be present in irrigation water or soils in many parts of the world. The FRRL is identifying genes and genetic mechanisms that respond to, and tolerate, salt stress. This information will be used in breeding programs to assist the development of pasture and turf grass varieties that can thrive under saline conditions.

**Larson**

Extraordinary plants are needed for sustainable feedstock production in the unique growing environments of the western U.S. Creeping x basin wildrye hybrids developed by FRRL display robust vegetative growth, biomass capacity, forage quality, and adaptation. These hybrids are being used to identify genes and novel trait combinations needed to create new agricultural opportunities and enrich native environments.

**Jensen**

U.S. western rangelands are often severely disturbed by fires, erosion, and invasive weed infestation and require reseeding with genetically improved plant materials to reclaim such sites. The FRRL is developing improved wheatgrasses and wildryes to meet this demand and to ensure rangeland biodiversity and maintain soils.

**Robins**

New molecular marker-based selection strategies will enhance the efficiency (more rapid and dramatic gains in key agronomic traits) of perennial grass cultivar development for forage and turf. Orchardgrass is being used as a model system to improve its production and tolerance to abiotic stresses. Likewise, turf grass breeding of Kentucky bluegrass is focused on increasing drought and salinity tolerance and improved nutrient-use efficiency to reduce cultivation inputs.

**Waldron**

Cheatgrass and wildfire are severely impacting wildlife habitat and livestock grazing on U.S. western rangelands. The FRRL is developing tall, nutritious forage kochia that reduces wildfire, while providing critical habitat and winter grazing. Tall forage kochia will reduce winter feeding costs to rangeland users, and minimize impact of wildfire on livestock and wildlife.