

Orchardgrass

- Orchardgrass germplasm with improved winter survival for high-elevation, cold-temperate regions.
- Identify hybrid vigor groups that lead to high-yielding, persistent orchardgrass hybrids and cultivars.
- Develop novel orchardgrass germplasm that will be used for gene mapping and incorporation of improved stress tolerance and the forage production into current populations.



Orchardgrass grazing evaluation

Warm-season Grasses

- Assess the feasibility and utility of warm-season grasses for grazing in areas with predominantly cool-season grass pastures.
- Develop switchgrass cultivars adapted to the irrigated pastures of the semi-arid western U.S.



Warm-season grasses in a temperate environment

Endophytes

- Collect and evaluate the potential of new fungal endophytes to improve drought, salt, and insect tolerance in grasses.
- Develop methods to transfer potentially beneficial endophytes into pasture grass species.

Seed available from the Utah Crop Improvement Association
1-435-797-2082

ARS Mission

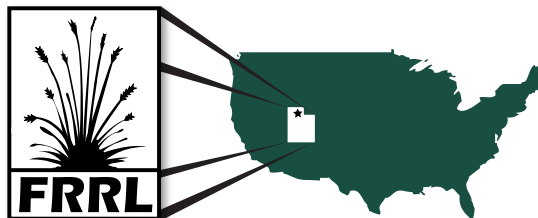
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- enhance the natural resource base and the environment, and
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PLANTS FOR THE WEST

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IRRIGATED PASTURE RESEARCH

Forage and Range Research Laboratory



IRRIGATED PASTURES

VISION

To develop improved plant materials that enhance productivity of irrigated pastures in semi-arid growing regions.

RESEARCH OBJECTIVES

1. Release new varieties with improved nutritional quality, palatability, and livestock utilization.

Outcomes

Improved grass and legume cultivars that have enhanced digestibility, elevated soluble sugar concentrations, and softer, more-palatable leaves to increase animal intake, gains, and health.

2. Develop improved plants that require reduced inputs of irrigation and fertilizer.

Outcomes

New grasses and legumes that can survive drought and efficiently utilize limited fertilizer, are compatible in grass/legume mixtures, and will conserve water resources.



Line-source irrigation for drought analysis

3. Discover improved selection protocols and methods for use in forage germplasm improvement.

Outcomes

Research will elucidate how plant spacing, machine harvesting versus livestock grazing, and hybrid vigor affect plant selection to make forage breeding more effective and efficient.

4. Develop new genomic resources for use in evaluation and breeding.

Outcomes

Molecular biology tools used in breeding and selection that will elucidate the genetic mechanisms behind increased digestibility, soluble sugar, and soft leaves.

5. Identify the role of plant endophytes in abiotic and biotic plant stress tolerance in semi-arid growing regions.

Outcomes

Research will determine the extent and differences in plant genetic control versus symbiotic fungal endophyte effects upon drought and other stress tolerances.

IMPROVED PLANT AND MANAGEMENT PRACTICES:

Fescue

- High-yielding tall fescue cultivars with improved nutritional quality (e.g., higher digestibility and soluble sugars, and lower lignin).
- Soft-leaved fescue germ-plasm to be used in breeding programs to improve live-stock intake and utilization of tall fescue.
- Tall fescue cultivars with increased drought tolerance that require less irrigation to maintain high yields.
- Tall fescue cultivars that are more compatible with nitrogen-fixing legumes for improved economic and environmental sustainability.
- Genetic mapping in tall fescue to understand traits of interest including soft leaves, higher digestibility, and drought stress.
- Discovery and development of evaluation and selection methods that allow simulation of seeded stands and grazed pastures.



Highly digestible tall fescue

Bromegrass

- Recent release of 'Cache' meadow bromegrass (2004) with improved yield under reduced irrigation.
- High yielding, drought tolerant meadow bromegrass cultivars for dryland (very limited irrigation) pastures.



'Cache' meadow bromegrass

Legumes

- Recent release of 'Don' yellow-flowered alfalfa (2008) with extreme persistence under reduced irrigation. 'Don' also possesses a lower growth form that mixes well with grasses to provide nitrogen for grasses.
- High yielding, salt-tolerant, spreading-type (rhizomatous) alfalfa cultivars which are adapted to the intensive grazing.
- Non-bloating birdsfoot trefoil cultivars that are high yielding and persistent under intensive grazing in irrigated pastures.
- Drought tolerant, upright cultivars of cicer milkvetch and kura clover as legume components in pasture mixes.
- Identify growth factors that influence compatibility of legume/grass mixtures and their interaction with the environment.
- Identify and map genes controlling salt tolerance in legumes.



Non-spreading (left) and spreading (right) alfalfa



Trefoil grazing persistence study