

# Alternative Forages in the Colorado River Basin



Hunter Doyle

Intermountain West Agronomy Specialist

The Land Institute

# Background

## Hunter Doyle

- Colorado Native
  - Grand Junction since 2016
- BS Environmental Sciences – CMU
- MS Soil and Crop Sciences- CSU
- Currently Agronomist for the Land Institute
  
- Four years @ CSU Research Center in Fruita, CO
  - Research focused on forage crops
  - Thesis “Intercropping alfalfa with select grass species for improved yield and quality under deficit irrigation regimes.
  - Involved in a variety of other research projects
- Colorado River user





# There are options!!

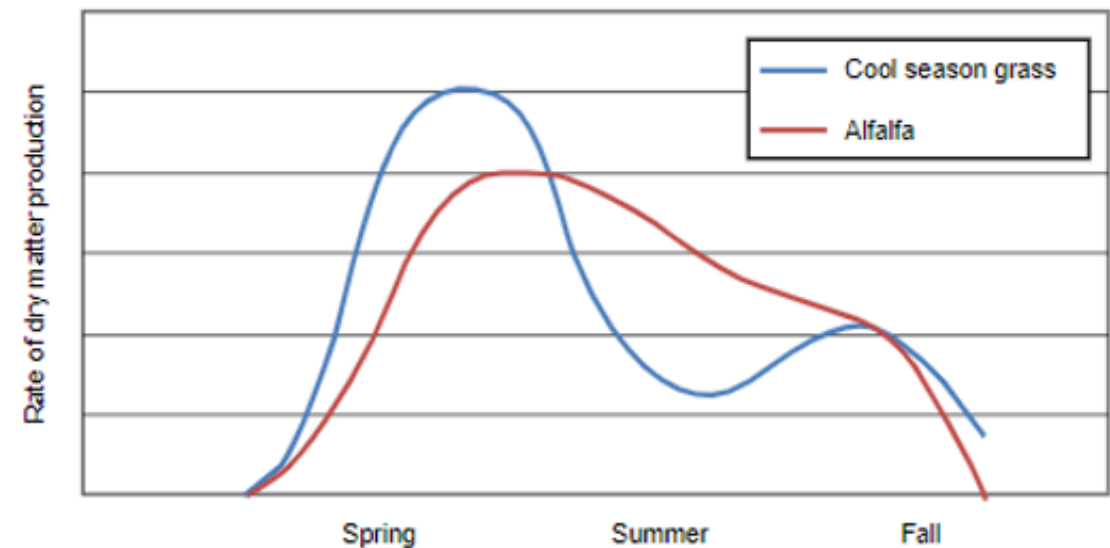
- Understand you area and climate!!
  - Elevation, temperature, precipitation
  - Soil test!!!!
- Irrigated, limited-irrigation, dry land
- Grasses vs legumes?
  - Cool vs warm season
  - Hay vs pasture
  - Mixtures
  - Varieties??
  - Native vs Introduced
- Market or animals you are feeding?

# Resources:

- Intermountain Grass and Legume Forage Production Manual
  - <https://rangemanagement.extension.colostate.edu/land-and-livestock/intermountain-grass-legume-forage-production-manual/>
- Forage Information System – OSU
  - <https://forages.oregonstate.edu/>
- Colorado Forage Guide (small acreage management)-CSU
  - <https://sam.extension.colostate.edu/wp-content/uploads/sites/2/2016/07/forage-guide.pdf>

# Alfalfa-grass intercropping

- Can work with other legumes
  - Vetch, birds foot trefoil, sainfoin
- Meadow brome, Orchard grass, Tall Fescue
- First year alfalfa dominates
  - Over time, grass begins to take over
  - Longer stand longevity
- Two different root systems
  - Two different growing habits
  - N fixation benefits the grasses
  - More effective water/nutrient use



# Sainfoin (*Onobrychis viciifolia*)



- Perennial cool-season legume
  - Native to Russia, Siberia, Turkey region
  - Has root nodules with nitrogen fixing bacteria
  - High quality forage crop, extremely palatable, possible pollinator crop
  - Goes to maturity early spring
- Deep rooted plant with wide range of adaptability
  - Heat, drought, and cold resistant
  - Does well in all soil textures, pH>6
  - Wide range of elevations suitable for growth
  - Deep rooted

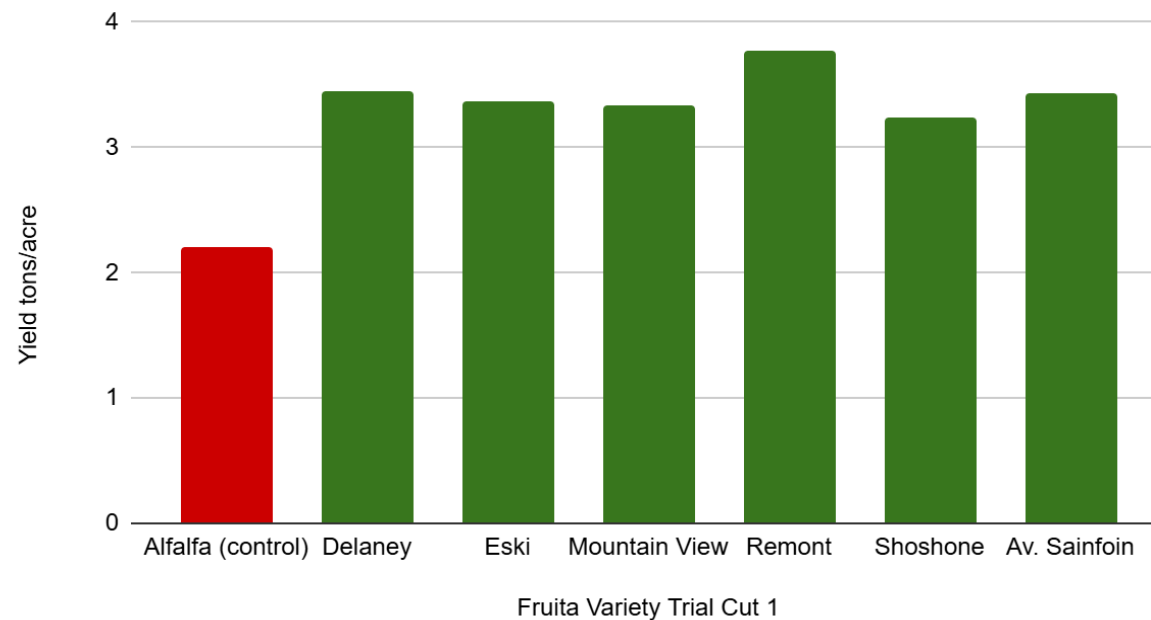
# Sainfoin continued

- Typically harvest at mid to full bloom
  - Growth occurs till full bloom
  - Can benefit pollinator species
  - Stems are hollow and remain succulent, therefore maturity does not decrease quality as greatly as other forages
  - Breeding efforts are improving agronomic traits
- Non-bloating legume
  - Can be grazed or hayed
  - Contains tannins that bind to proteins in rumen
  - Can be an option in pasture mixtures
  - Typically preferred to other lush forbs



# Fruita Sainfoin C1

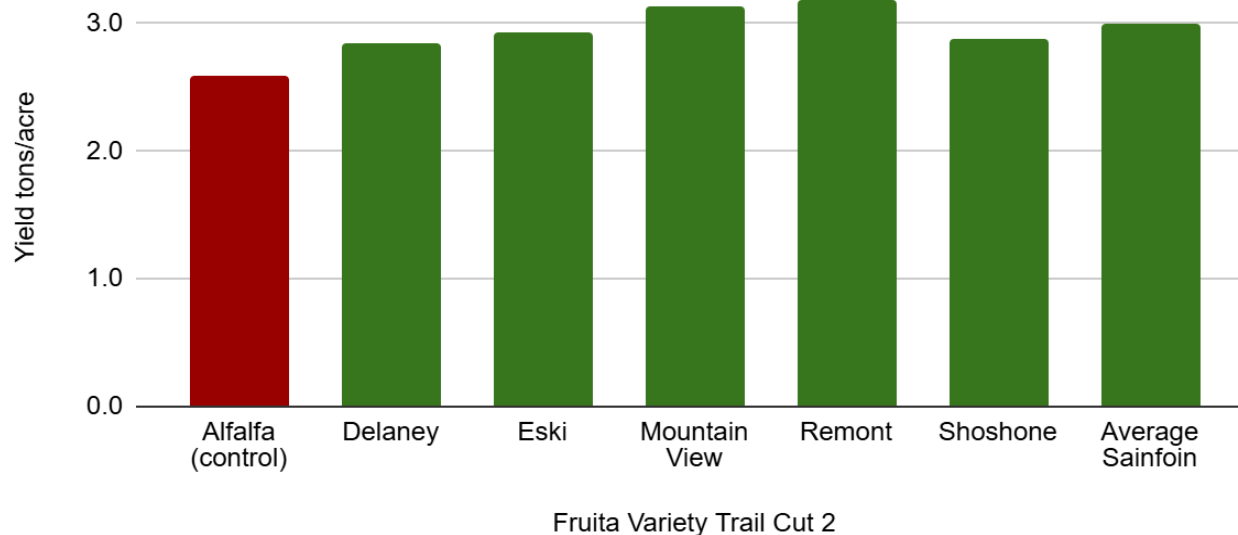
Fruita Variety Trial Cut 1	Yield tons/acre	Crude Protein %	Neutral detergent fiber %	Acid detergent fiber %	Relative feed value	Total Digestible Nutrients %
Alfalfa (control)	2.2	22.1	37.7	28.5	180.3	66.7
Delaney	3.4	20.0	34.6	29.0	186.9	66.3
Eski	3.4	18.9	33.0	31.0	170.4	64.7
Mountain View	3.3	19.4	35.4	33.5	156.4	62.8
Remont	3.8	18.6	37.4	32.3	162.0	63.7
Shoshone	3.2	19.1	36.7	32.1	159.1	63.9
Av. Sainfoin	3.4	19.2	35.4	31.6	167.0	64.3





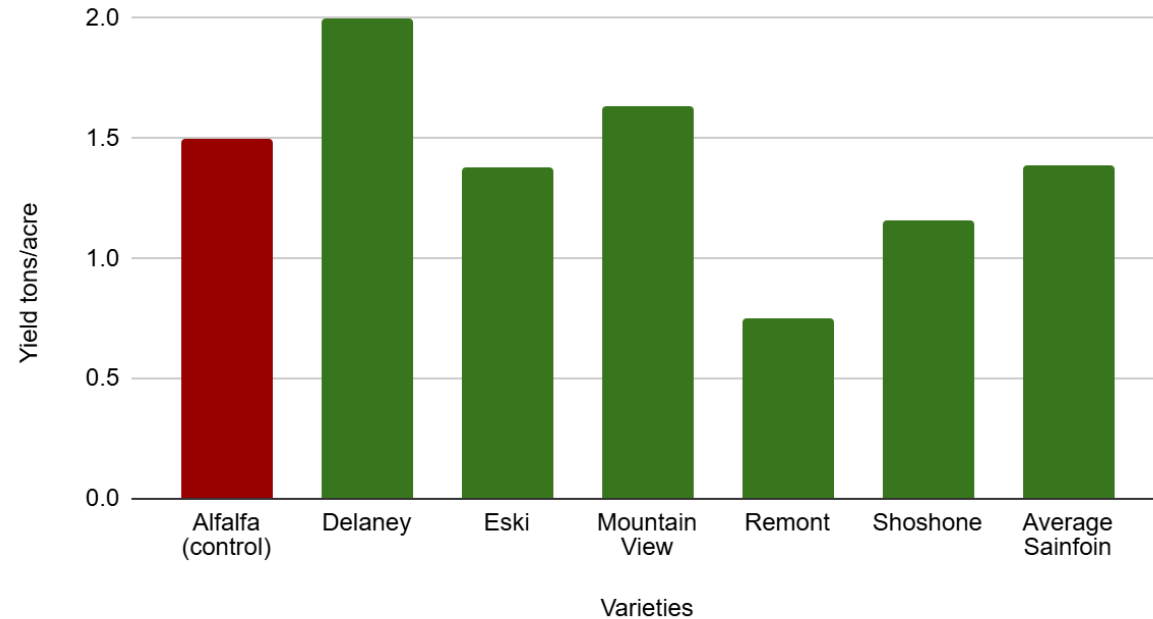
# Fruita Sainfoin Cut 2

Fruita Variety Trail Cut 2	Yield tons/acre	Crude Protein %	Neutral detergent fiber %	Acid detergent fiber %	Relative feed value	Total Digestible Nutrients %
Alfalfa (control)	2.6	20.3	43.6	41.3	122.3	56.7
Delaney	2.8	14.7	45.0	42.9	114.9	55.5
Eski	2.9	16.0	47.4	45.9	105.6	53.1
Mountain View	3.1	14.4	50.9	49.6	92.4	50.3
Remont	3.2	15.0	46.2	45.0	108.7	53.8
Shoshone	2.9	16.2	50.1	48.6	94.9	51.0
Average Sainfoin	3.0	15.2	47.9	46.4	103.3	52.7



# Fruita Sainfoin Cut 3

Fruita Variety	Yield tons/acre	Crude Protein %	Neutral detergent fiber %	Acid detergent fiber %	Relative feed value	Total Digestible Nutrients %
Trail Cut 3						
Alfalfa (control)	1.5	23.5	33.7	31.4	178.6	64.5
Delaney	2.0	14.1	42.3	37.6	131.9	59.6
Eski	1.4	16.4	35.8	32.7	166.3	63.4
Mountain View	1.6	13.0	46.3	41.1	116.2	56.9
Remont	0.8	15.1	39.7	35.3	153.3	61.4
Shoshone	1.2	17.1	36.3	32.6	167.7	63.5
Average Sainfoin	1.4	15.1	40.1	35.9	147.1	61.0



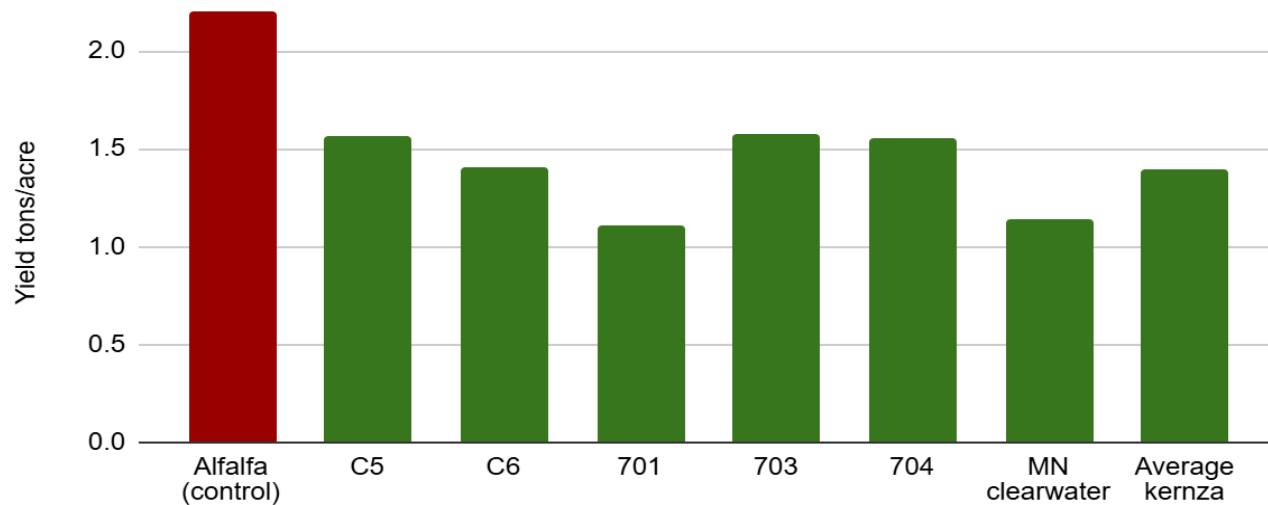
# Intermediate Wheat Grass

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- *Thinopyrum intermedium*
- Long lived cool-season perennial grass
  - Short rhizomes
  - Forage production, seed production, conservation programs,
  - Adapted to a wide range of soil and environmental conditions
    - Deep rooted, adapted to wide range of pH, soil conditions, salinity, and climates (3500 to over 9000 feet)
- Can do well with limited irrigation (at least 13 inches)
- Best production in spring and fall



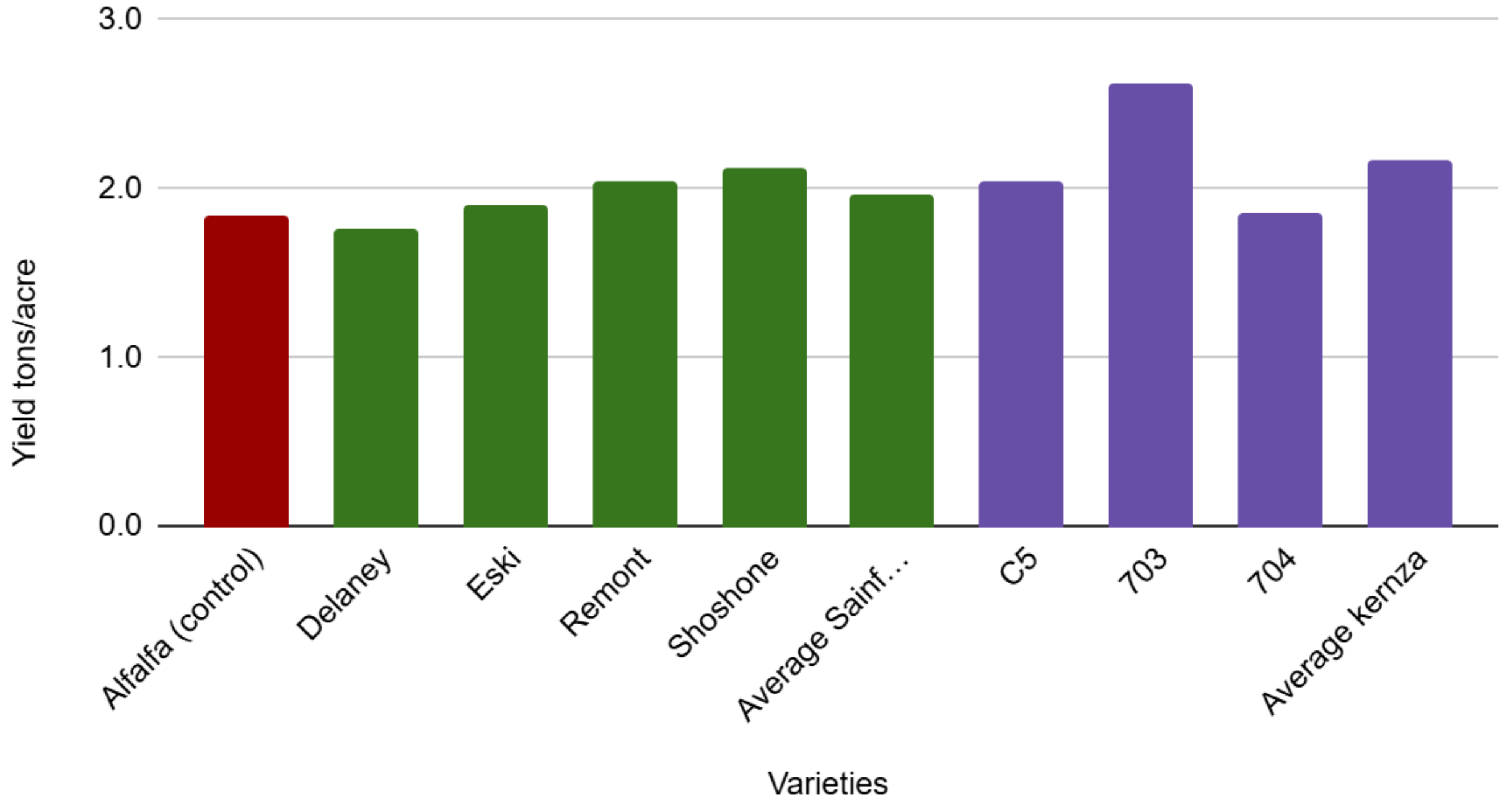
Fruita Variety Trial Cut 1	Yield tons/acre	Crude Protein %	Neutral detergent fiber %	Acid detergent fiber %	Relative feed value	TDN%
Alfalfa (control)	2.2	22.1	37.7	28.5	180.3	66.7
C5	1.6	13.9	53.4	28.6	116.2	66.7
C6	1.4	14.2	52.8	28.4	118.0	66.8
701	1.1	12.8	52.0	28.0	120.6	67.1
703	1.6	12.4	55.0	29.5	111.5	65.9
704	1.6	14.8	51.8	27.7	121.1	67.3
MN clearwater	1.1	13.8	54.0	29.18	114.1	66.17
Average kernza	1.4	13.6	53.2	28.6	116.9	66.6



# SWCRC Variety Trial Cut 1

SWCRC Variety Trial	Yield tons/acre	Crude Protein %	Neutral detergent fiber %	Acid detergent fiber %	Relative feed value	Total Digestible Nutrients %
Alfalfa (control)	1.8	21.2	35.2	28.3	178.8	66.8
Delaney	1.8	17.9	38.5	34.3	153.1	62.2
Eski	1.9	17.9	37.6	34.7	153.2	61.9
Remont	2.0	17.6	41.4	38.3	135.4	59.1
Shoshone	2.1	16.8	39.3	33.6	149.4	62.7
Average Sainfoin	2.0	17.5	39.2	35.2	147.7	61.5
C5	2.0	13.2	60.0	34.3	96.6	62.1
703	2.6	13.2	61.3	35.2	93.5	61.5
704	1.8	13.7	59.8	33.4	98.2	62.9
Average kernza	2.2	13.3	60.4	34.3	96.1	62.2

# SWCRC Variety Trial Yield Cut 1



# Endophyte free / Novel Endophyte Tall Fescue

- *Festuca arundinacea*
- Perennial cool-season bunch grass
  - wide range of soils types and elevations
  - Wide range of pH, fertility, moderate salinity
- Adapted to wide range of climates, heat and cold tolerant
  - Cool and humid (Mountains), to hot and dry (GJ)
  - 12 inches precipitation minimum
- Good quality and yield
  - 6-7 tons acre (OSU)
  - >20% CP, 73% TDN @ early veg
  - 16.4% CP and 60% TDN @ mid bloom



# Endophyte free / Novel Endophyte Tall Fescue

- Make sure to get Endophyte Free or Novel Endophyte!!
  - If endophyte is present, can cause a wide range of issues with animals
  - Transmitted via seed, ensure you get good seed
- Varieties/Cultivars
  - Forager, Fuego, Johnstone, Mozark, Martin, Penngrazer
  - Duramax Gold, Jesup MaxQ, Texoma Max Q2
- Pasture or hay
  - Palatability can be fair to poor
  - Earlier cuttings are higher quality, more palatable, less yield
- Best production in spring and fall







# Utah Sweet Vetch

- One of many vetches that can be used as a forage
  - Cicermilk vetch, hairy vetch, common vetch
  - Legume
- 4000' to 8000' elevation, 10 to 18 inches precip
  - Wide range of soils it can do well in
  - Bloat free
- Perennial, can creep slightly
  - Hay or pasture
- Seed availability can be an issue sometimes
- New cultivars always being developed

# Birdsfoot Trefoil

- Perennial, cool-season legume
  - Winter hardy, wide range of pH
  - Limited water (12" to 13"), can respond well to more too
  - Bloat free, highly palatable
  - Water logged to well drained soils
- Erect or prostrate varieties
  - Erect better for hay, prostrate/semi-erect better for pasture
- High quality forage, comparable to alfalfa
  - 60-80% yield of alfalfa
- TDN% @ bud stage = 65.8%
  - @ 10% bloom = 62.6%

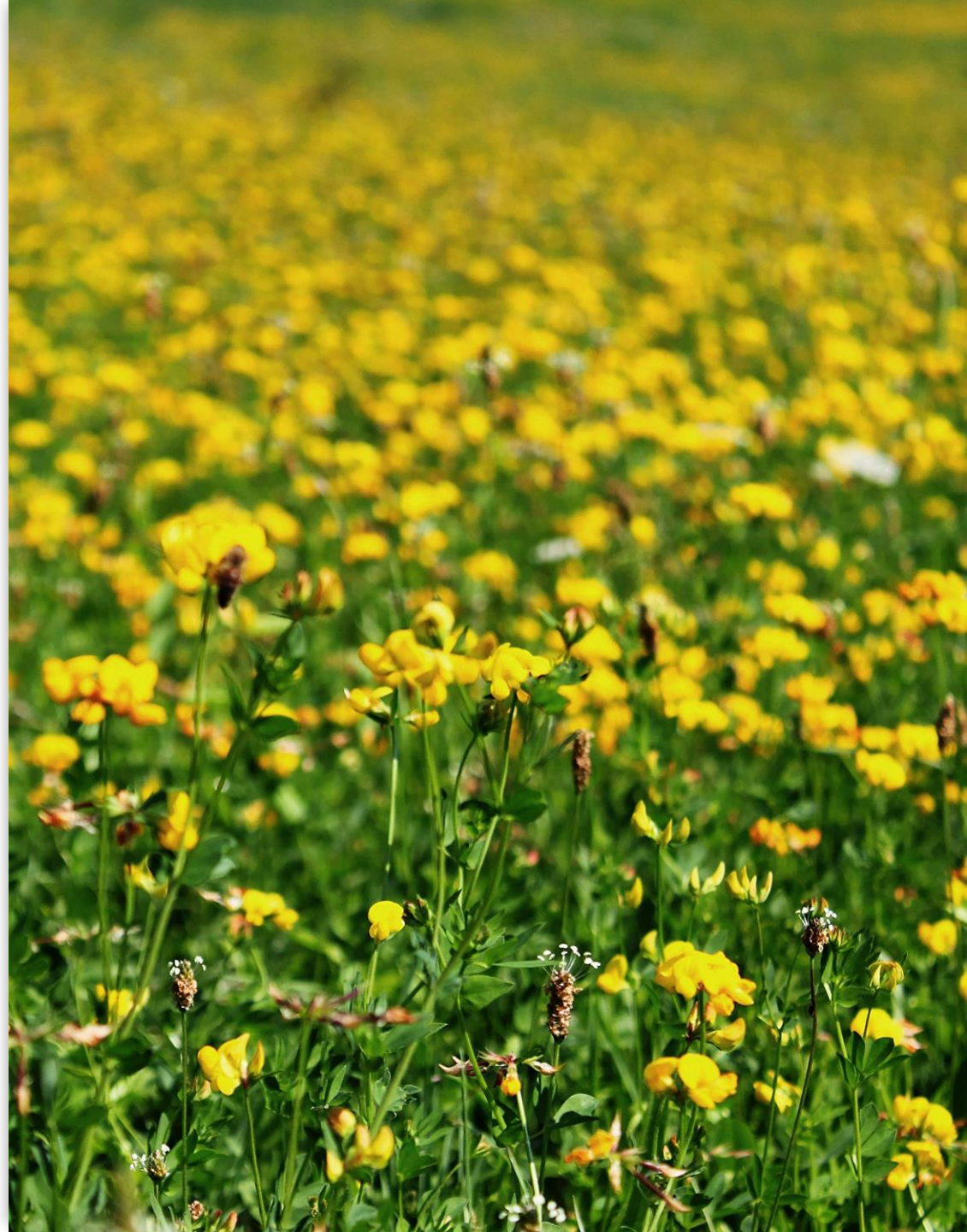


Table 4. Performance of heifers when grazing alfalfa and birdsfoot trefoil.

Year	Alfalfa	Birdsfoot trefoil
<b>Average daily gain (lb/day)</b>		
1	1.39	1.90
2	1.57	1.68
Mean	1.48	1.79
<b>Heifer production (lb/A)</b>		
1	309	396
2	392	380
Mean	351	388



# Non-exhaustive list of other potential forage species

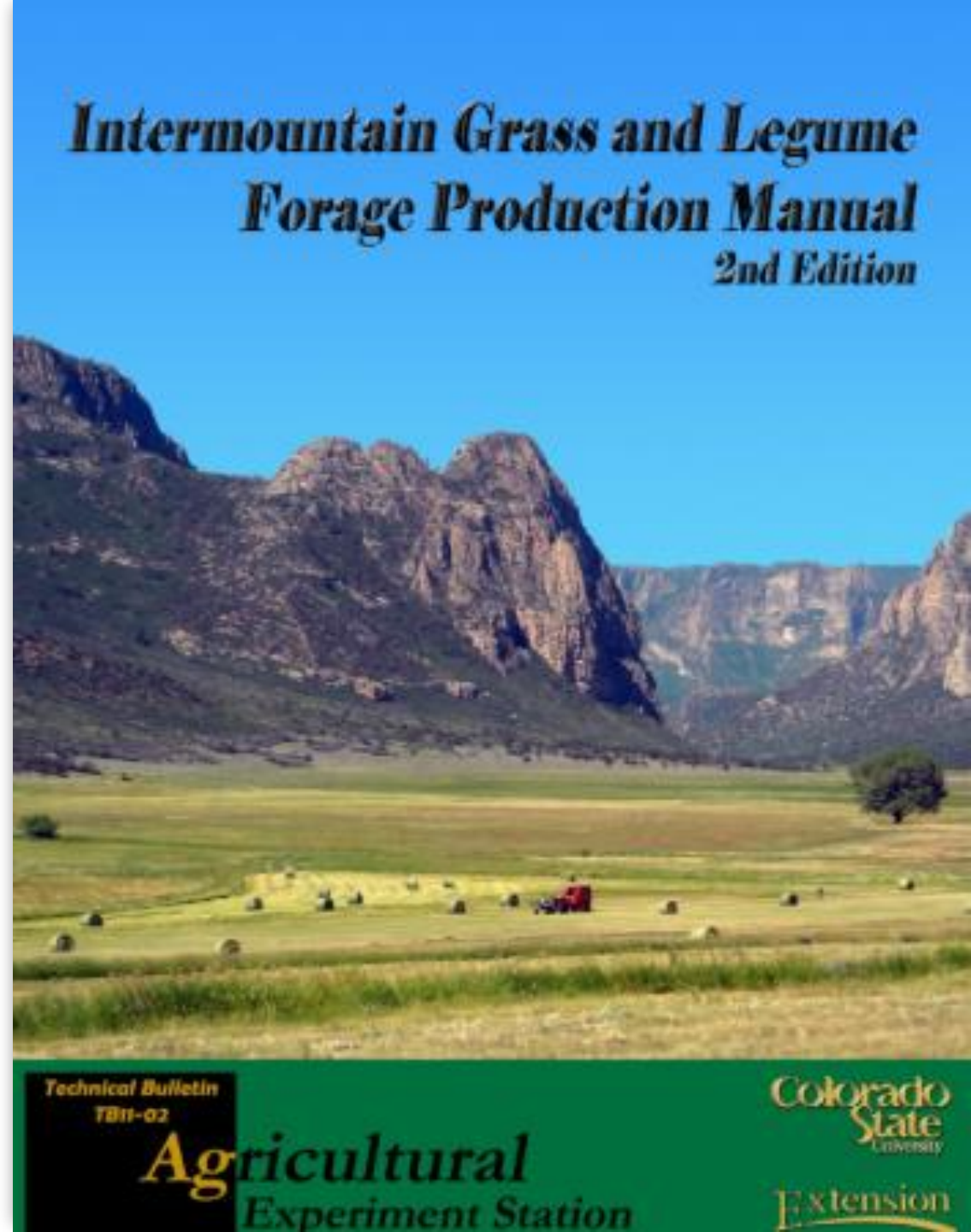
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- Grasses: Western WG, Thickspike WG, Pubescent WG, Crested WG, Tall WG, Meadow brome, Smooth brome, Basin Wildrye, Slender WG, Snakeriver WG, reed canary grass, Timothy, Russian wildrye, Bermuda grass, rye grasses, teff, millet, oats, sorghum, big bluestem, little blue stem, switchgrass, side oats gamma, hybrid wheatgrass, mountain brome
- Legumes: clovers (Red, White, Alsike, Kura, Berseem, Balansa, Strawberry, Crimson), cowpea, different vetches, falcata, faba bean, lespedeza, peas, small bernette
- Forbes!!!



# Resources:

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# Orchardgrass

## *Dactylis glomerata* L.

## OSU Forage Information System

**Symbol:** DAGL

**Group:** Monocot

**Family:** Poaceae

**Description:**

Herbaceous, cool-season, perennial bunchgrass. Extensively used as a forage, as pasture and erosion control in mixtures with other grasses and legumes, and as hay and silage, typically as a well-drained soil conditions. Highly palatable to all livestock classes. No animal health issues, e.g. does not cause bloat.

**Uses:** Pasture

Hay

Silage

Mixture

Monoculture

Soil Protection (Cover Crop)

Wildlife

▸ Identification Characteristics

▸ Growth Habit and Stand Life

▸ Climate and Soil Suitability Zones

▸ Suitability Maps

▸ Yield Potential and Production Profile

▸ Management Level Required

▸ Quality and Antiquality Factors

▸ Image Gallery

▸ Resources



Thank you