FENUGREEK HAS POTENTIAL TO USE AS A FORAGE CROP

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Fenugreek

What is fenugreek?

*Multi-purpose* annual legume crop grown for:
- Spice (seed)
- Culinary herb (vegetative part)
- Medicinal (seed)
- Forage (whole plant)
- Tea after boiled and sweetened
- Lower-cost, artificial maple syrup
- Good breastmilk stimulator (*up to* ↑900%)
- Can be grown as rain-fed crop (*↓water use*)
- Fix atmospheric N – improve soil health

*All these make fenugreek a specialty crop!*
Fenugreek

*Adaptation, genetics and botanical aspects of fenugreek*

- Native to Indian subcontinent & eastern Mediterranean region
- Cultivated in all habitable continents of the world
  - fenugrec (France), fierno greco (Italy) alholva, feno-greco (Spain), helba (Arabic), methi (India, Pakistan)
- Self-pollinating,
- Diploid (2n=16) annual legume
- Family: *Fabaceae*
- Genus: *Trigonella*
- Species: *foenum-graecum*

“Greek Hay”
Fenugreek

**Adaptation, genetics and botanical aspects of fenugreek**

- **Stem**: Erect, hollow, green to pinkish; typically grows 30-60 cm in height

- **Leaf**: Trifoliate, usually toothed

- **Flower**: Forms 35-40 d after seeding; yellow to white

- **Pod**: 10-19 cm in length; contains 10-20 seeds; brown, slender, sickle-shaped
Fenugreek

Adaptation, genetics and botanical aspects of fenugreek

- Seed: Tuberculate; yellow-to-amber colored
**Fenugreek**

**Uses:**

- **Whole plant**
  - Forage
  - Insect repellents

- **Leaves**
  - Vegetable/salad
**Fenugreek**

**Uses:**

- Whole seed
  - An ingredient in curry powder
  - Natural health product
  - Pharmaceuticals
  - Coloring agent (dye)
  - Component in seasoning and flavoring mixture
  - Components use perfumery industry (essential oil)
  - Supplement in wheat/maize flour
Fenugreek

**Uses: Medicinal**

- Anti-oxidant
- Anti-bacterial
- Anti-anorexia
- Anti-diabetic
- Anti-cancer
- Anti-ulcer
- Anti-inflammatory
- Diuretic
Fenugreek

*Uses: Medicinal*

- Gastric stimulant
- Lactation stimulant
- Hypo-glycemic effect
  - Reduces blood glucose levels
- Hypo-lipidemic effect
  - Reduces LDL cholesterol and increases HDL cholesterol levels
- Hypo-cholesterolaemic effect
  - Reduces plasma cholesterol levels

**Major bioactive compounds in seed**

- Galactomannan
  - Soluble fiber source
- 4-Hydroxyisoleucine
  - Insulin-stimulating properties
- Diosgenin
  - Enhances muscle building & milk production in cattle
Instead of multi-purpose uses, unfortunately, *no information* is available on whether this important specialty crop will grow to maturity in the central High Plains.

**Objective:**

- Evaluate some promising genotypes/accessions for the phenotypic adaptability and stability for growth, seed yield, and quality.

- Select/develop cultivars suitable for the regions.
**Approach:**

**Genotypes/accessions:** 13 (collected from Canada)

**Two locations:** - one at UW, Laramie (irrigated);
- one at SAREC, Lingle (irrigated and dryland)

**Rep.: 4; Design: RCBD; Sowing date:** Jun 1 & 2, 2010; May 2 & 10, 2011

**Seeding rate:** 27 PLS kg/ha; **Unit plot size:** 1.5 m × 4.6 m

**Plots:** two groups, forage and seed production

**Harvesting:** forage - Aug 31 & Sep 3, 2010; Aug 15 & 23, 2011;
Fenugreek Assessment

Major activities in 2010

- Planting; Jun 2, 2010
- Emerging Seedling; Jun 18, 2010
- Young Plants; Jul 13, 2010
- Matured Plants; Aug 5, 2010
- Plant Harvesting; Aug 31, 2010
- Seed Harvesting; Oct 14, 2010
Fenugreek Assessment

RESULTS
# Fenugreek Assessment

## Dry matter (DM) yield at Lingle and Laramie in 2010 & 2011

<table>
<thead>
<tr>
<th>Variety/Line</th>
<th>SAREC, Lingle</th>
<th>UW, Laramie</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Irrigated</td>
<td>Dryland</td>
<td>Irrigated</td>
</tr>
<tr>
<td><strong>Amber</strong></td>
<td>1430</td>
<td>8112</td>
<td>346</td>
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<td><strong>F17</strong></td>
<td>1511</td>
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<tr>
<td><strong>F70</strong></td>
<td>1510</td>
<td><strong>10702</strong></td>
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<tr>
<td><strong>F75</strong></td>
<td>1550</td>
<td>5828</td>
<td>631</td>
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<tr>
<td><strong>F80</strong></td>
<td><strong>2388</strong></td>
<td>6992</td>
<td>372</td>
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<tr>
<td><strong>F86</strong></td>
<td>1740</td>
<td>7008</td>
<td>348</td>
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<tr>
<td><strong>F96</strong></td>
<td>1812</td>
<td>6801</td>
<td><strong>747</strong></td>
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<tr>
<td><strong>IT</strong></td>
<td>1061</td>
<td>7517</td>
<td>825</td>
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<tr>
<td><strong>L3068</strong></td>
<td>1170</td>
<td>6681</td>
<td>377</td>
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<tr>
<td><strong>LRC3375</strong></td>
<td>1683</td>
<td>8168</td>
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<tr>
<td><strong>LRC3708</strong></td>
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<td><strong>Tristar</strong></td>
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<tr>
<td><strong>X92</strong></td>
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<td>502</td>
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<tr>
<td><strong>LSD0.05</strong></td>
<td>1127</td>
<td>4767</td>
<td>365</td>
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*Variations among lines*  
*DM irrigated > dryland*
# Fenugreek Assessment

## Seed yield at Lingle and Laramie in 2010 & 2011

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<td><strong>852</strong></td>
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- Variations among lines
- Seed irrigated >> dryland
Forage quality at Lingle and Laramie in 2010

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<tr>
<td><strong>Crude protein (%)</strong></td>
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<tr>
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<tr>
<td><strong>LSD0.05</strong></td>
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</tbody>
</table>

- **CP ranges:** 14-20%
- **IVTDMD:** 56-72%
- **ADF:** 27-39%; **NDF:** 36-58%
- **RFV:** 100-171%; **Lignin:** 6-11%

NIRS - Irrigated ≈ dryland
Summary

- Large variations observed among lines for growth/DM
  - *Irrigated lands produced higher than dryland*

- Variations also observed in seed yield
  - *Irrigated lands produced much higher than dryland*

- Forage quality was similar among lines and under irrigated and dryland conditions

- Has potential to be used as a forage crop both in irrigated *(forage + seed)* and rain-fed environments *(forage)*
Acknowledgment

- Jerry Nachtman
- Jim Krall
- Robert Baumgartner
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Questions?