**Industrial Hemp Taxonomy:**

**Domain:** Eukaryota
**Kingdom:** Plantae
**Phylum:** Spermatophyta
**Subphylum:** Angiospermae
**Class:** Dicotyledonae
**Order:** Urticales
**Family:** Cannabaceae
**Genus:** Cannabis
**Species:** Cannabis sativa

**Where to start?**
- CDA Website: [https://www.colorado.gov/pacific/agplants/industrial-hemp](https://www.colorado.gov/pacific/agplants/industrial-hemp)
Where to start?

• Find your end market, work on a farm management/business plan.
  • SBDC - [http://www.sbdcfortlewis.org/](http://www.sbdcfortlewis.org/)
  • End Product:
    • CBD
    • Fiber
    • Grain
  • Labor Constraints?

Seed

• Short Day Plant
  • Vegetative – 18H light, 6H dark
  • Reproductive – 12H light, 12H dark
  • Cross pollinated
• Dioecious vs. Monoecious
  • What is a hermaphrodite?
    • The sexual dimorphism of Cannabis is genetically determined by the XY chromosomal mechanism although sexual morphology is primarily a result of endogenous plant growth regulator levels that fluctuate in response to environmental variables. [Hall et al. 2012]

Hermaphrodite

Plants will develop male characteristics at a certain point in an effort to ensure seeds are produced before the stressor can kill the plant. Life Strategy!

- Changes in the photoperiod, specially interruptions of the dark period during flowering
- Too much heat (>30°C, 86°F approximately)
- Harvesting too late
- Mechanical stress: broken branches, damaged roots, pruning during flowering...
- Irrigation issues (lack or excess)
- Over-fertilization
- Insects, mites, diseases...
- Thermal stress (irrigating plants with cold water...)
- Use of phytotoxic products (pesticides, fungicides...)

Hemp Flower Anatomy

Hemp Flowers

Female

Male
Mohan Ram and Sett (1982) suggest Silver Thiosulfate (STS) can be used to make male flowers with viable pollen on female hemp plants. Male flowers induced on genetically female plants will produce pollen containing only X gametes, which when crossed with eggs from female plants result in all-female seed (Mohan Ram and Sett, 1982). Foliar sprays of STS have been effective at blocking ethylene production and extending the flowering time for several different species of ornamental plants (Cameron and Reid, 1981, 1983; Lubell and Brand, 2018).

Methods for Seed Feminization:
- Gibberellic Acid
- Colloidal Silver
- Silver Nitrate
- Silver Thiosulfate
- All block ethylene production, create male flowers with only X gametes. Cross-pollination still possible!

Transplant or Clone?
- **Planting Date**: Target June 1 – Dependent on seed vs. transplant/clone
- **Planting Depth**: Shallow 0.5-1”
- **Soil pH**: 7.0-7.5 - SW CO: 6.9-8.0
- **Seeding/Planting Rate**:
  - **CBD**: 1500-2000 plants per acre.
  - **Fiber**: 40-80 lb/a - 30-35 plants/ft²
  - **Grain**: 25-40 lb/a - 10-15 plants/ft²
The Basics

• Irrigation: 12-28 inches, Drought tolerant in later growth stages

SW CO: 15-24 in.

No significant yield increase from 15 in. to 19 in.

Pest Management

• Crop Rotation:
  - Compatible: Wheat, Bean, Alfalfa
  - Not Recommended: Canola, Edible Beans, Sunflowers

• Tillage

• Be a good neighbor.

• Pesticide labeling:
  - The Colorado Pesticide Applicator Act prohibits use of a pesticide in a manner inconsistent with the product labeling.
  - Any pesticide used in the cultivation of Cannabis must be registered with the Colorado Department of Agriculture.

Harvest Timing:

<table>
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<tr>
<th>Harvest Method</th>
<th>September 26, 2018</th>
<th>November 1, 2018</th>
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<tbody>
<tr>
<td>Hemp Harvest Methods</td>
<td>September 26, 2018</td>
<td>November 1, 2018</td>
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</tbody>
</table>
Storage and Drying:

Hemp Research Trials
• 3 Varieties x Planting Date
  • Helena  x  May 15
  • Fedora  x  June 1
  • Felina  x  June 15

<table>
<thead>
<tr>
<th>Variety</th>
<th>Yield (Wet) (lb/acre)</th>
<th>Standard Error</th>
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<tbody>
<tr>
<td>Helena</td>
<td>16,199.48</td>
<td>1,564.44</td>
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<tr>
<td>Fedora</td>
<td>17,162.64</td>
<td>1,155.5</td>
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<tr>
<td>Felina</td>
<td>15,749.36</td>
<td>1,510.16</td>
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<tr>
<td>LSD (p&lt;0.05)</td>
<td>3,478.8</td>
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</table>

<table>
<thead>
<tr>
<th>Planting Date</th>
<th>Yield (Wet) (lb/acre)</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 15</td>
<td>17,220.72</td>
<td>1,704.92</td>
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<tr>
<td>June 1</td>
<td>16,475.36</td>
<td>1,270.08</td>
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<tr>
<td>June 15</td>
<td>15,415.40</td>
<td>1,155.41</td>
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<tr>
<td>LSD (p&lt;0.05)</td>
<td>3,295.3</td>
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LSD (p<0.05)

Questions?