Growing Hemp for Fiber or Grain

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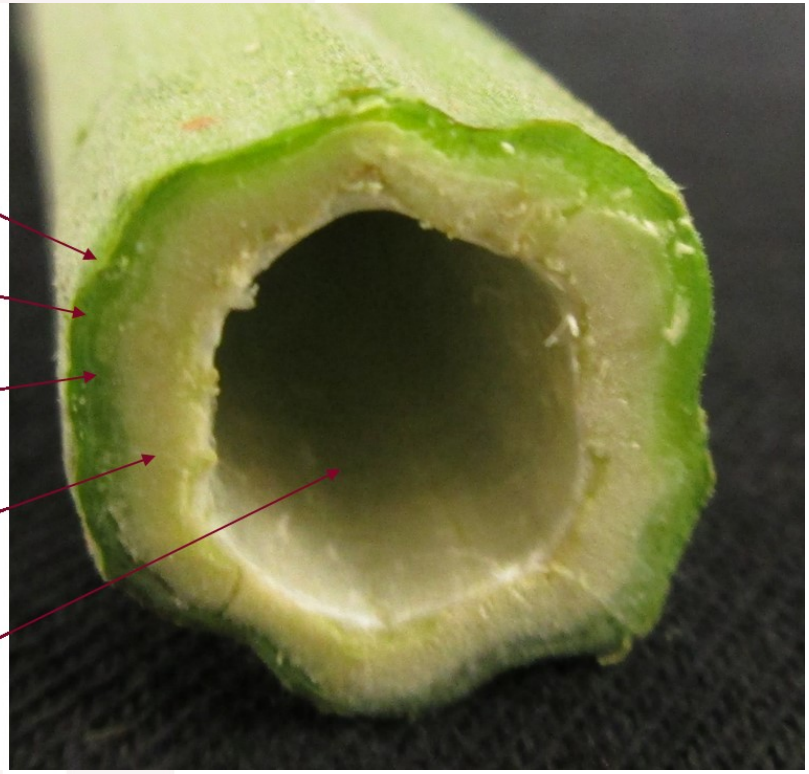
1890 Land-Grant Institution

Fiber and Grain Hemp

- Can fit into existing grain/forage crop production models
- The major limitation is finding a processor that will purchase these crops

Hemp: A Bast Fiber



Epidermis/
"Bark"

Phloem/
"Fiber"

Cambium

Xylem/
"Hurd" or
"Shiv"

Pith

Planting a Fiber Crop

- Use a fiber or dual-purpose (fiber and grain) variety directly seeded into the field
- Plant mid-May to late-May
- Planted ¼ to ½ deep with a grain drill
- High plant density (30-35 live seed/ft^2), ~60 lbs./A
- Use 7-8” between rows for quick canopy closure and weed suppression

Growing Hemp for Fiber

- Plant should reach 10-15+ ft
  - the taller the better
  - long slender stems
- Best estimates for fertility
  - N: 50-100 lbs./acre
  - P: 45-60 lbs./acre
  - K: 35-100 lbs./acre

Fiber Crop Maturity

- When male plants are at starting to flower
- Usually this will be mid-August for Ohio
- Cut with a sickle-bar or disc mower
- Leave to ret

Retting

- Retting is a controlled rotting process that loosens the fibers from the hurd
- Cut green stalks are left in the field 2-6 weeks to “ret”
- Relies on fungi and bacteria to degrade pectin binding fibers to the hurd
- Turns brown to gray color, some charcoal covered spots

“Bowstring” Test

- Natural separation of the fiber from the hurd during the retting process
- Indication the stalks are properly retted

Baling

- 1-ton round or square bales
- Moisture content – 16% or below to avoid molding, <10% may result in brittleness and impact fiber quality
- Avoid contaminating weeds in bales
- Avoid getting any plastic or debris in bales
- Do not bale up stones as they will cause damage to farm and factory equipment. May become lodge in bottom of bales sitting on gravel

Storage

- Store bales in dry conditions
- Rewetting of the bale leads to rotting of stalks and the bale falling apart
- Due to their shape, round bales resist water damage and rotting better
- Square bales are easier to stack but need to be covered
- Higher value stalk material for textiles should be stored in a protected environment (i.e., barn or warehouse)

Fiber Processing

Decortication

- Separation of the fiber from the hurd
- Commercial scale equipment is expensive
- Some portable systems being developed

https://cannasystems.ca/images/media/PowerZoneProfile1.jpg

https://www.alibaba.com/product-detail/Jute-Decorticator-Calcutta-hemp-Fibre-Extracting_60506920882.html?spm=a2700.7724857.normalList.37.c6e97fa1pZhcK1

Challenges - Fiber

- Processing infrastructure!
- Demand from consumers (businesses)
- Quality varieties for US production
- Consistent retting

Hemp Grains

- Industry sometimes calls seeds as nuts (hemp nut)
- Achene: a small dry indehiscent one-seeded fruit developing from a simple ovary and usually having a thin pericarp attached to the seed at only one point (Merriam-Webster)

Planting Grain Hemp

- Use a grain or dual-purpose (fiber and grain) variety directly seeded into the field
- Plant late-May to late-June
- Planted ¼ to ½ deep with a grain drill
- Moderate plant density (10-15 live seed/ft^2), ~30 lbs./A
- Use 7-8” between rows for quick canopy closure and weed suppression

During the Season

- Plant should reach 5-6 ft tall
  - taller leads to problems harvesting
  - shorter leads to weed problems
- Best estimates for fertility
  - N: 100-130 lbs./acre
  - P: 45-75 lbs./acre
  - K: 35-100 lbs./acre

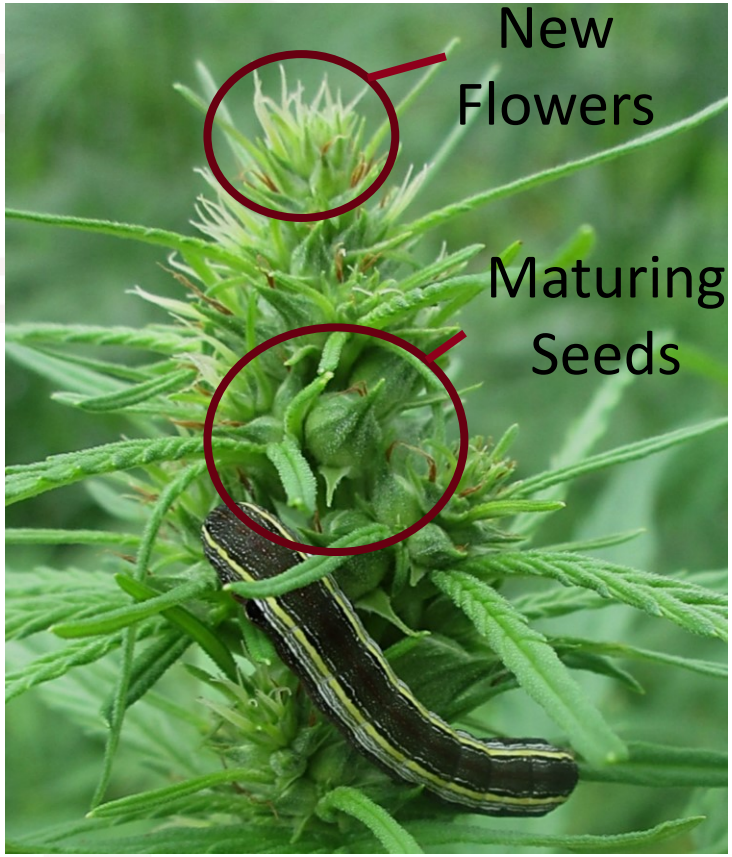
Seed Shattering

Seed shattering = the loss of a seed from the mother plant

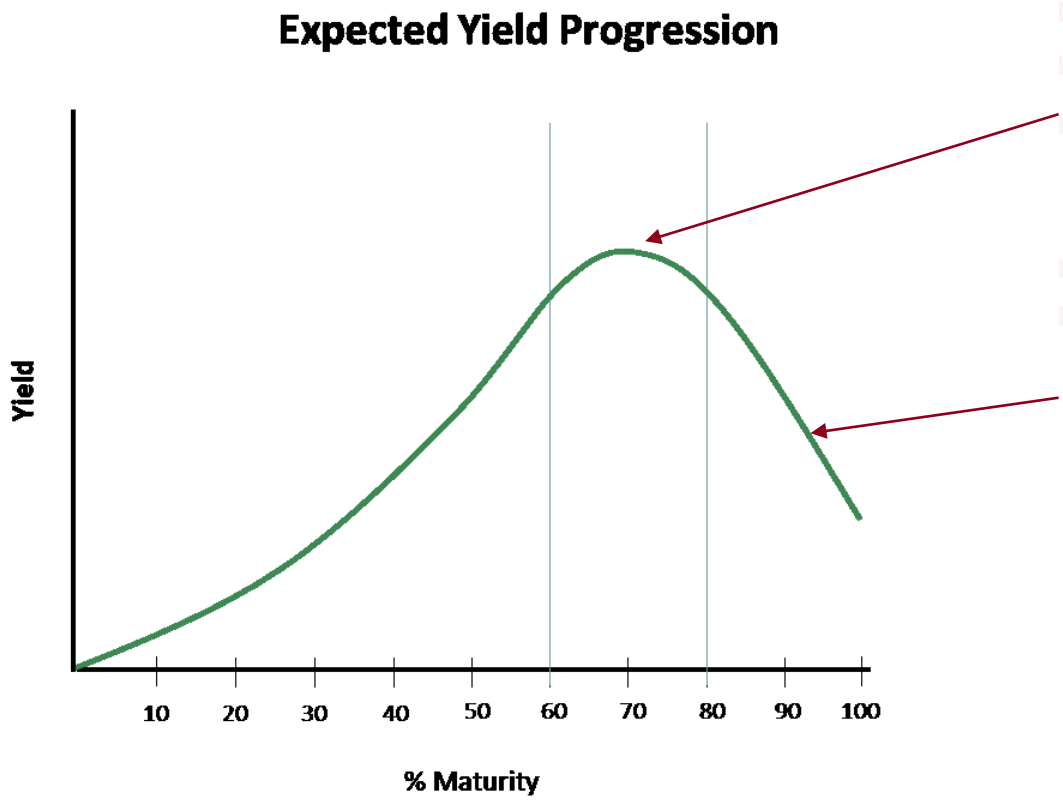
Hemp Is Indeterminant

Indeterminant Growth =
Apical meristem keeps growing and setting new flowers buds while previous flowers continue to mature and set grain

Promotes a wider duration of seed maturation



Hemp Yield Dynamics



There will be a short time for maximum yield

Decrease in yield due to shattering

Hemp Seed Maturity

Harvest around 70 percent maturity (when bracts are half to mostly brown but PRIOR to opening)

Grain Harvesting

- Ready for harvest in early-Sept to early-Oct depending on variety
- Harvested with grain combine
- Cut right below the grain head
- Go slow with combine
- Seeds are harvested at 12-18+% moisture but needs dried down to 8%
- Good yield would be 1000+ lbs./A

Drying Grain

- **MUST** dry wet grain
- The wetter the material the more urgent the drying – should start within hours of harvest
- Grain can go rancid quickly
- Low slow heat with ample aeration

Storage

- Store grain in a clean grain bin
- Keep grain dry location
- Keep moisture content around 8%
- Avoid temperatures above 75°F (24°C)
  - Polyunsaturated fats go rancid
  - Seeds are prone to splitting/cracking

Sanitation

The main use of hemp is as a raw health food!

- Maintain cleanliness throughout the harvest process
- Prevent birds and animals from getting in equipment
- Clean trucks before hauling cleaned seed
- Avoid contamination with wheat and other gluten-containing seed
- Clean grain soon after harvest to reduce growth on molds and bacteria

Grain Processing

Pressing Hemp Seed

- Used grain whole
- Dehulled
- Press to obtain oil and seed cake
- Seed cake can be further purified into protein powder

https://www.envirotextile.com/hemp-harvesting-and-processing-equipment/

Challenges - Grain

- Shattering of grain
- Identifying appropriate harvest time
- High seed moisture content
- Need for drying grain
- Lack of regional processors

Additionall Information

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Central State University Extension
1400 Brush Row Rd., Wilberforce, OH
centralstate.edu/csuextension

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Types of Hemp Crops

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Hemp—Getting Started

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Questions