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

1890 Land-Grant Institution
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/ft²), ~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

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/ft²), ~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

Expected Yield Progression

- There will be a short time for maximum yield
- Decrease in yield due to shattering

Pollination → Plant Death
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

Challenges - Grain

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

Types of Hemp Crops
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Hemp—Getting Started
By Craig Schluttenhofer, PhD.
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Questions