

An aerial photograph showing a green John Deere tractor with a hemp harvester attachment moving through a field of tall, green hemp plants. The tractor is positioned in the lower center of the frame, leaving a path of cut hemp behind it. The field is vast and green, with a dirt path curving through it. In the background, there are rolling green hills, scattered trees, and a farm with several buildings and silos under a blue sky with light clouds.

Mississippi Hemp Cultivation Task Force

Agronomy Sub-committee

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Photo Credit – University of Kentucky

ID-250 – An introduction to Industrial Hemp and Hemp Agronomy



Purpose – Provide the MDAC, the Mississippi Legislature, and Mississippi producers with the salient issues related to:



Industrial hemp production systems, production practices, planting and harvesting equipment needs,



Processing, potential markets, and supply chain requirements.



Research needs.

2018 Farm Bill

To participate in commercial production of industrial hemp:

- Mississippi state law must be revised to exempt industrial hemp and hemp-derived products from the list of controlled substances.
- The state must develop, submit to USDA, and secure approval of a plan that meets the requirements of the 2018 Farm Bill.
- Hemp must be produced in accordance with the provisions of State and Federal law
- Adequate supply chains must be developed that include seed/equipment sources, processors, and markets.



Hemp Products



Fiber

Upholstery, molded composite materials, automotive interior panels, twine/rope, construction and insulation materials, fabrics and textiles, concrete and animal bedding.



Seed

Hemp seeds are high in oil and protein. They can be pressed for oil used in food and body products, roasted and consumed whole, ground as flour, or pressed into cakes.



Cannabinoid Oil Extracts

Hemp produces more than 100 cannabinoids (e.g. CBD) that might have therapeutic value.



Hemp Products

Production systems specific to each of these primary products differ in terms of:



Germplasm or propagule type and production



Planting methods and equipment



Harvesting process and equipment



Labor



Markets and Economics



Industrial Hemp Crop Production

- Spring planted annual.
- Similar fertility requirements to wheat (\$100-125/acre, at least 100 units N, more for grain, less for fiber).
- Mature to fiber in 60-90 days.
- Seed/Grain production 100+ days.
- CBD production systems vary, many resemble tobacco or vegetable production.
- Extremely sensitive to light cycle.



Grain Production

- Similar to small grain production
- Desire short plants for ease of harvest
- Planted with a grain drill
- Harvested using combine



Grain Production

- Asynchronous maturation
- Harvested when 70% of grain mature
- Predicting ideal harvest window is challenging
- Must be harvested in short window due to seed shatter issues.



Grain Yields

- Seed/Grain Yield = Average 800-1,000 lbs/acre
- \$0.65- \$0.75 per pound
- Hemp Grain is high in oil and protein



Fiber Production

- Very dense plant population (twice as dense as grain).
- Tall plants with small stalk, and less leafy material.
- Harvested using typical hay equipment: mow, field retting 2-3 weeks, then roll baling.
- Some areas of the world harvest by chopping,



Fiber Yields

- Yields 1-5.5 tons per acre of dry matter (whole dry stems).
- Fiber price \$70-\$135 / ton for whole stems.
- Fiber crop vs dual purpose.
- Stems = 15-20% Bast, 70+% Hurd, 5-10% Waste.



Cannabinoid Oil Production



Cannabinoid Oil Production



Clones of Mother Plants



Mechanical clone planter



Field Cultivation



Hand Harvest, dried in barns,
hand stripped



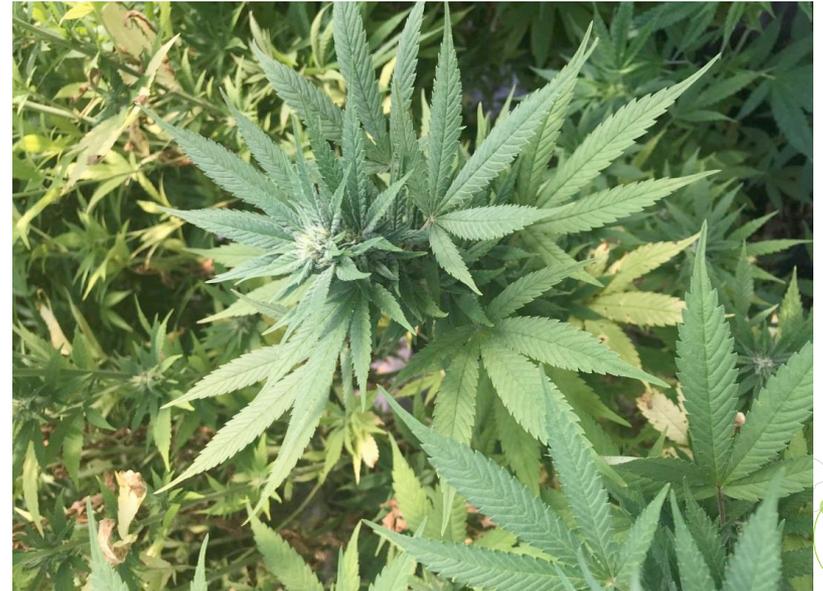
Raw hemp to be
processed into CBD oil



Oil extractors

Cannabinoid Oil Production

- Majority of growers - Only female plants.
- Desire bushy plants with large number of flowers
- Current Production models tobacco or vegetable.
- CBD Levels are highest in the floral materials.
- Both field & greenhouse production



Cannabinoid Oil Production

- Maximum production for one plant = 1 lb dried floral material for extraction.
- Reports of prices as high as \$1,000 / lb for dried material, prices today continue to decline RAPIDLY.
- Emerging market; more product on market will see reductions in price to between \$5-\$10/lb.
- Extract generated per lb of dried material varies widely.





- Most varietal development from Canada and Europe, no locally adapted cultivars
- No cultivar varietal trials in Mid-south
- Competition control – no labeled herbicides
- Pest control – no labeled pesticides
- Fibrous crop hard on harvest equipment.
- Markets, processors, and supply chains undeveloped
- Currently no crop insurance

Challenges



- Seed importation – In April 2019, USDA announced that Hemp seeds can be imported into the United States from Canada if accompanied by either:
 - a phytosanitary certification from Canada’s national plant protection organization to verify the origin of the seed and confirm that no plant pests are detected; or
 - a Federal Seed Analysis Certificate (SAC, PPQ Form 925) for hemp seeds grown in Canada.

Recent Policy Changes



Recent Policy Changes

- Varietal development
 - in April 2019, the USDA announced that the Plant Variety Protection Office (PVPO) will start accepting applications of seed-propagated hemp for plant variety protection.
 - Availability of PVP protection will open the door for accelerated development and commercialization of new and improved varieties.



Recent Policy Changes

- Crop Insurance
 - In August 2019, USDA announced that certain industrial hemp growers will be able to obtain insurance coverage under the Whole-Farm Revenue Protection (WFRP) program for crop year 2020.
 - Risk Management Agency (RMA) announced coverage for hemp grown for fiber, flower or seeds, which will be available to producers who are in areas covered by USDA-approved hemp plans or who are part of approved state or university research pilot programs.
 - Producers can obtain WFRP coverage for hemp now if they are part of a Section 7606 state or university research pilot as authorized by the 2014 Farm Bill.
 - *Other producers cannot obtain coverage until a USDA-approved plan is in place.*
 - WFRP provisions state that hemp having THC above the compliance level will not constitute an insurable cause of loss.
 - Additionally, hemp will not qualify for replant payments under WFRP.



- Critical immediate research topics include:
 - Development of systematic, regionally replicated variety testing programs to document varietal and geographic variation in yield, quality, fiber/seed/oil characteristics, and disease resistance.
 - Development of seed certification protocols for certified seed production in compliance with Mississippi seed law.
 - Testing and development of crop protection products to control weed competition, disease, and insect damage.
 - Development of nutrient management guidelines suitable for Mississippi soils.
 - Development of new and improved varieties with superior yield, disease resistance, and fiber/cereal chemistry, and cannabinoid profiles.

Research Needs



- Critical immediate research topics include:
 - Development of improved harvesting and post-harvest management practices and equipment.
 - Development of realistic crop production budgets based on Mississippi production costs, yields and market access.
 - The effects of environmental stress on THC levels are poorly understood, but must be addressed to mitigate producer risk of exceeding regulatory thresholds leading to crop destruction.
 - Product development for hemp fiber, seed, and oil extracts.
 - Regionally-specific crop production budgets and projected revenue estimates that fully account for risk (environmental, regulatory, market, etc) must be developed to inform producer decision making.

Research Needs