Types of Hemp Crops

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Commercial hemp production was legalized in the U.S. by the Agriculture Improvement Act of 2018. On July 30, 2019, Senate Bill 57 was enacted, legalizing hemp production in Ohio. Hemp produces three main types of crops: fiber, grain, and metabolites. Each crop type has unique production techniques, practices, land, labor, facilities, equipment, and economic requirements. As hemp cultivation starts in Ohio, perspective growers need to decide the type of hemp crop to produce.

General Hemp Considerations

Like all plants, hemp has specific needs and general suggestions are listed with each crop in this fact sheet. When reviewing the crop needs, note that optimal requirements of hemp production in Ohio and the U.S. remain largely unknown. In particular, considerable research is needed for determining optimal regional planting dates and fertility requirements. The presented information is the current best estimation of crop requirements. Research is ongoing to identify nutrient, planting dates, and other needs.

The proper amount of hemp seed needed for planting is important for successful hemp production. Calculating the planting density for hemp is more complicated than other crops. Hemp seeds vary in size from one to two grams per 100 seeds. Moreover, the germination rate of hemp seed is lower than other crops; often around 70 to 90 percent. The variation in seed size and germination rate hinders recommending a set weight of seed to plant per acre. Seed test weight and germination percentages should be used to calculate the number of pounds of total seed per acre for planting.

Because hemp production is relatively new, production, harvest, and storage techniques will evolve and improve over time. Specifically, harvest and post-harvest handing methods for metabolite hemp varies considerably. Some mechanized methods are becoming available, but need to be evaluated based on the final product required by the processor.

The following sections contain descriptions and information regarding each type of hemp crop: fiber, grain, and metabolites. Look for more information about hemp production on the Central State University Extension website at centralstate.edu/csuextension.
Fiber Hemp Crops

**Planting Time:** Mid-May to Late-May

**Planting Method:** Grain drill

**Planting Density:** 1,306,000 to 1,524,000 live seeds/acre (30-35 seeds/square feet)

**Fertility:** N: 50-100 lbs./acre, P: 45-60 lbs./acre, K: 35-100 lbs./acre

**Crop Height:** 10 to 16 or more feet tall, optimal height is at least 14 or more feet

**Crop Appearance:** Very tall plants with slender stems. Dioecious (male and female flowers on separate plants) or monoecious (male and female flowers on the same plant).

**Harvest Time:** Mid-August to Late-August. The crop is harvested when male plants start flowering (releasing pollen) but prior to females flowering.

**Harvest Method:** Sickle-bar or disc mower. Plants will be allowed to lay in the field to ret.

**Post-harvest Handling:** The controlled rotting process (retting) of hemp separates the fibers (outer stringy portion of the stem) from the hurd (the inner woody part). Retting takes two to six weeks depending on the available moisture—higher moisture leads to faster retting. Retting is complete when fibers easily separate from the hurd. After retting is complete, the hemp stalks are baled in one-ton round or square bales.

**Storage:** Bales can be covered and stored outside or placed in a storage facility. The stalks are stored at 10 to 16 percent moisture. Less than 10 percent moisture causes brittleness and may impact fiber quality.

**Markets:** Primarily decorticators (which are processors that separate the various components of the stem) to be processed into fiber.

**Comments:** Leave gaps between rows of bales to improve airflow and water run-off. Do not place bales on gravel as it imbeds and affects processing. Avoid foreign materials and weeds in bales.
Grain Hemp Crops

Planting Time: Late-May to Late-June

Planting Method: Grain drill

Planting Density: 435,000 to 653,000 live seeds/acre (10-15 seeds/square feet)

Fertility: N: 100-130 lbs./acre, P: 45-75 lbs./acre, K: 35-100 lbs./acre

Crop Height: 4 to 8 feet tall, optimal height 5 to 6 feet

Crop Appearance: Single grain head on end of the stalk. Dioecious (male and female flowers on separate plants) or monoecious (male and female flowers on the same plant).

Harvest Time: Early-September to Early-October. The crop is harvested around 70 percent maturity (when bracts are half to mostly brown). Avoid letting bracts surrounding seeds open as this results in shattering (loss of seed from the mother plant). Harvest prior to heavy rains or strong winds to minimize shattering.

Harvest Method: Combine (preferably with draper head). Go slow through the field (2 to 3 mph) as the material will be very wet and hard on the machinery. The combine head should be adjusted to cut right below the majority of grain heads to minimize the amount of stalk material entering the combine.

Post-harvest Handling: Grain will be 12 to 18 or more percent moisture at harvest. It needs to be quickly cleaned then placed in a grain bin and dried with forced air to remove excess moisture and prevent spoilage. Grain can spoil quickly. Do not store overnight in grain wagons. Excess heat will lead to seed cracking and spoilage.

Storage: Grain is stored at 8 to 10 percent moisture. Periodic aeration is needed to mitigate moisture in grain bins.

Markets: Food companies where it is processed into food products

Comments: Monitor the combine carefully during harvest as stalks can wrap around gears and cause part failures and/or fires. As most seed is for human consumption, sanitary practices must be practiced throughout crop production and storage.
Metabolite Hemp Crops

**Planting Time:** Late-May to Mid-June

**Planting Method:** Transplanter (vegetable or tobacco) or by hand, start with clones or seedlings

**Planting Density:** 1000 to 2500 plants/acre (4’x 4’ to 6’x 6’ spacing)

**Fertility:** N: 50-100 lbs./acre, P: 45-60 lbs./acre, K: 35-100 lbs./acre

**Crop Height:** 4 to 10 feet tall, optimal height 5 to 6 feet

**Crop Appearance:** Bushy plants with multiple flowers. Dioecious (male and female flowers on separate plants). Males are culled to leave only the female plants.

**Harvest Time:** Mid-September to Mid-October. Plants are harvested 5-10 weeks (usually 7 weeks) after initiation of flower. Cannabinoid concentration tends to increase with time. Some growers judge maturity by the transition floral trichomes from clear to cloud or amber. Regular testing is needed to monitor THC (levels cannot exceed 0.3 percent total THC).

**Harvest Method:** Plants are usually cut by hand using a machete or chain saw. As plant height increases so does the difficulties handling the crop. Crops in excess of six feet can be challenging to handle and dry.

**Post-harvest Handling:** Post-harvest handling often depends on requirements from the extractor. Typically, plants will be hung to dry (commonly in tobacco barns, pole-barns, or warehouses). Plants are dried in the dark at 60-70°F with 45 to 60 percent relative humidity and ample airflow. Dried plants are then stripped to remove flowers, with or without leaves. Stripped material is typically placed in large totes for storage and transport.

**Storage:** Optimal storage conditions are largely unknown. Material should be around 8 to 10 percent moisture to avoid mold growth. Lower moisture (less than 8 percent) leads to brittleness and difficulties handling.

**Markets:** Extractors to be processed into health supplements; Dispensaries for cured flower sold as is

**Comments:** A wide variation exists in post-harvest handling methods. Contact the perspective buyer of the crop to identify any specific requirements. When hang drying, small branches will snap instead of bend when the plant is sufficiently dry. Outer branches of plant will droop, reducing airflow to the center of the plant.