Cannabis Genotypes, Chemotypes, and Phenotypes: Distinguishing Industrial Hemp from Hemp and High-THC Cannabis

How can we tell the difference between "industrial hemp" (grown for grain and fiber) from "hemp" (grown especially for cannabinoids) from "high-THC Cannabis"?

The genetic traits that characterize different varieties of Cannabis are known as a plant's **genotype**. These traits are pre-determined by the plant's genetic makeup.

The plant's chemical ratios of cannabinoids and terpenes are known as its **chemotype**. Certificates of Analysis from laboratory testing can show these ratios.

The observable traits that result from both the plant's genetics and environment are known as the plant's **phenotype**. Phenotypes are visually recognizable and are especially helpful to distinguish industrial hemp from hemp and high-THC Cannabis.

Specific characteristics of grain-hemp include:

- field crop
- grain-drill seeding (200k-500k plants per acre)
- single stalk with seeded flower head
- both male and female plants, notably visible pollen sacks
- some monoecious varieties
- combine harvested and seed separated
- any minimal floral material integrity destroyed in field

Specific characteristics of fiber-hemp include:

- densely planted row crop
- grain-drill seeding (800k - 1m plants per acre)
- tall fibrous stalks (6-20 ft)
- both male and female plants, notably visible pollen sacks
- some monoecious varieties
- harvested prior to flower and seed maturity
- field retted
- any minimal floral material integrity destroyed in field

Specific characteristics of cannabinoid-hemp and high-THC Cannabis include:

- typically horticultural production (indoor or outdoor)
- outdoor tree-like planting (4-8 ft apart) featuring a low plant population (5k-10k plants per acre)
- branching plants with large flowers featuring concentration of cannabinoids
- female plants only

This is why it's important to look at the chemotypes of hemp grown for cannabinoids and high-THC Cannabis through laboratory THC testing to determine the plant's cannabinoid ratios, and why it is not necessary to test industrial hemp grown for grain or fiber.

Example: young densely planted grain or fiber hemp crop designed for combine harvesting.

Example: mature densely planted grain or fiber hemp crop designed for combine harvesting.

Example: separated rows of young cannabinoid-rich hemp or marijuana designed for harvesting flowers.

Example: mature cannabinoid-rich hemp or marijuana plant producing flower buds.