

Botanists conduct first large-scale genetic study of marijuana, hemp

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A study by Canadian researchers is providing a clearer picture of the evolutionary history and genetic organization of cannabis. Credit: Jonathan Page

A study by Canadian researchers is providing a clearer picture of the evolutionary history and genetic organization of cannabis, a step that could have agricultural, medical and legal implications for this valuable crop.

"Even though hemp and [marijuana](#) are important crops, knowledge about [cannabis](#) is lacking because of its status as a controlled drug," said Jonathan Page, a University of British Columbia botanist who co-led the first large-scale study of the [genetic diversity](#) of cannabis. The research was conducted together with Sean Myles, a population geneticist at Dalhousie University.

Researchers looked at the genotypes of 81 marijuana and 43 hemp samples. Using the DNA variants in the cannabis genome, they were able to search for relationships between different plants. They found that [cannabis plants](#), which consist of three species (*C. sativa*, *C. indica* and *C. ruderalis*), are often incorrectly labeled.

Popular lore assigns different characteristics to marijuana plants. For example, Indica-type plants are believed to produce relaxing and sedative effects as opposed to more stimulating Sativa-type plants. The researchers found only a moderate correlation between the ancestry of marijuana strains reported by breeders and the ancestry inferred from their DNA. For example, a sample of Jamaican Lambs Bread, which is classified as *C. sativa*, was almost identical at a genetic level to a *C. indica* strain from Afghanistan.

"Cannabis breeders and growers often indicate the percentage of Sativa or Indica in a cannabis strain, but they are not very accurate," Page explained.

While hemp plants also go by the latin name *C. sativa*, researchers discovered that hemp showed a high amount of genetic separation from marijuana, likely due to the breeding of the [plants](#) for radically different uses.

Canada is a global leader in hemp production, with more than 80,000 acres devoted to seed and fibre production. A licence from Health Canada is required to grow marijuana for medical purposes, and there are now 25 licensed producers supplying about 21,000 Canadian patients. Understanding cannabis genetics and evolution could assist in better breeding efforts for both crops.

"The genetic difference between marijuana and [hemp](#) has [legal implications](#) in many countries," said Page. "Right now, the genetic identity of a marijuana strain cannot be accurately determined by its name or reported ancestry. Ultimately we require a practical, accurate and more reliable classification system of this plant."

The findings were published today in *PLOS ONE*.

More information: Sawler J, Stout JM, Gardner KM, Hudson D, Vidmar J, Butler L, et al. (2015) The Genetic Structure of Marijuana and Hemp. *PLoS ONE* 10(8): e0133292.

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