

Hemp hampered no more with research showing potential as cash crop

February 8 2022, by Kaine Korzekwa



This illustration lists the many uses of hemp in food, pharmaceuticals, and industrial products. The industrial hemp industry was shut down in the 1930s due to prohibition and confusion with its cousin, marijuana. The 2014 Farm Bill allowed for the reintroduction of this valuable crop to the United States. Credit: Sabry Elias, Aaron Cadena

After decades of being relegated and regulated, research on industrial hemp as a valuable crop is far behind. That's because the United States banned the use of hemp in the 1930s. The result was all research about this crop stopped, too. Now that the Farm Bill allows for the growing and use of industrial hemp, researchers have a decades-long gap in knowledge.

At the forefront of those trying to enter back into the [hemp](#) market—[seed companies](#) and potential growers—is [seed quality](#) after harvest.

This is where Sabry Elias, professor of crop and soil science at Oregon State University, and his team come in. Elias recently [presented his work](#) at the 2021 ASA-CSSA-SSSA annual meeting, held in Salt Lake City.

"One of the challenges in growing [industrial hemp](#) is that the [plants](#) have an indeterminate flowering pattern," Elias explains. "This results in seeds with different maturity levels and ages on the same plant at the time of harvest."

This poses a series of questions that Elias and his team investigate. What is the difference in quality between a seed higher on the plant versus one lower on the plant? How can they test for these quality differences? After harvest, do seeds go dormant? If they do go dormant, for how long and how can dormancy be broken?

There are two fundamentals that impact seed quality that the researchers investigated: viability and vigor. Viability is the capability of seeds to germinate and produce normal seedlings. Vigor is the ability of seeds to germinate and grow under a wide range of field conditions. Elias explains that these qualities are controlled by genetic and environmental factors.

"Improved varieties possess good traits such as [high yield](#), seed quality, and disease resistance," he says. "Seeds that develop and mature under optimum conditions resulted in quality seeds. On the other hand, seeds developed under moisture stress, nutrient deficiency, [extreme temperatures](#), etc. often result in light, shriveled seed or collectively called poor quality seeds."



A close-up of a hemp seedling. Research at Oregon State University is looking at the viability and vigor of industrial hemp seeds in the growing industry. Credit: Sabry Elias

The researchers performed four different tests on two varieties of hemp seeds. Two measured seed viability by trying to tell the difference between live and dead seeds. Two others measured seed vigor by looking at how fast they germinated and how well they grew under stress conditions.

"Two seed lots can have the same viability percentage (e.g., 85%), but one of them can be more vigorous than the other," Elias explains. "It is like both a 90-year-old and 25-year-old are alive, but the person who is 25 is (usually) healthier than the one who is 90 years old."

One viability test used [biochemical reactions](#) and subsequent color changes of seeds to measure if a seed is viable. The other measured the capacity of seeds to germinate and produce normal seedlings. One of the vigor tests germinated the seeds to test how quickly they do so. The second placed the seeds in high-stress conditions and then germinated them.

Their findings showed that all four of these tests were useful in measuring the quality of hemp seeds. The team's experiments also showed that harvesting the seeds lower on the hemp plant seven to eight days later than those higher on the plant improved the overall quality of the seeds.

"This makes the whole plant, upper and lower parts, available for harvest," Elias says. "It increases the yield by one-third because the current practice of some hemp farming systems is to harvest only the upper two-thirds of the plants to avoid the underdeveloped seeds from the lower part."

Lastly, the scientists looked at the dormancy of the seeds. Elias explains that dormant seeds are viable seeds but will not germinate even under favorable conditions, until dormancy is broken. Seeds are most dormant

right after harvesting.

Dormancy slowly disappears over time or with treatments such as pre-chilling, dry heat, or hormonal treatments. Their research showed that a pre-chilling treatment at 10 degrees Celsius for five days was able to break dormancy.

"I believe that hemp has great potential as a cash crop for growers in the United States and around the world because of its multiple uses in food, pharmaceuticals, and industrial products," Elias says. "In addition, I have passion for the areas of [seed](#) physiology, quality, and dormancy, particularly because research in hemp had been put off for decades."

More information: Seed Quality and Dormancy in Hemp (*Cannabis sativa* L.) [scisoc.confex.com/scisoc/2021a ... app.cgi/Paper/132766](https://scisoc.confex.com/scisoc/2021a...app.cgi/Paper/132766)

Provided by American Society of Agronomy

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<https://phys.org/news/2022-02-hemp-hampered-potential-cash-crop.html>

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