

Sunflower DNA map could produce plants for fuel

January 22 2010, By DIRK LAMMERS , Associated Press Writer



In this August 2005 photo released by the National Sunflower Association a sunflower farm is seen in Carrington, N.D. (AP Photo/ National Sunflower Association, File) NO SALES

(AP) -- A \$10.5 million research project aimed at mapping the DNA sequence of sunflowers could one day yield a towering new variety for both food and fuel.

Researchers envision crossbreeding a standard [sunflower](#) with the Silverleaf species out of Texas to produce a hybrid with bright yellow flowers bursting with tasty seeds and thick stalks filled with complex sugars that can be turned into ethanol.

The wild, drought-resistant Silverleaf is known for its woody stalks, which can grow up 15 feet tall and 4 inches in diameter.

"Since it's the closest relative of the cultivated sunflower, it should be perhaps reasonably straightforward to move some of the traits," said Loren Rieseberg, a University of British Columbia botany professor and leader of the DNA sequencing project.

The Genomics of Sunflower project is funded by Genome Canada through the Canadian government, Genome BC, the U.S. Energy and Agriculture departments and France's National Institute for Agricultural Research.

Its goal is to locate genes responsible for agriculturally important traits such as seed [oil content](#), flowering, drought and pest tolerance. Participants plan to map the genome for the greater sunflower family, known in the science world as Compositae and including more than 24,000 species of sunflowers, lettuce, artichokes, daisies, ragweed, dandelions and other plants.

Scientists hope that within four years, they'll be able to develop a basis for a breeding program in which understanding of the plants' genes dramatically reduces the time it takes to develop hybrids.

Rieseberg's work with co-investigator Steve Knapp from the University of Georgia has already been helpful to the industry, said Larry Kleingartner, executive director of the Mandan, N.D.-based National Sunflower Association.

Their research helped identify a trait that imparts resistance to downy mildew, which destroys [plant tissue](#), and its association with a gene that imparts resistance to rust, a fungus that affects yield and quality, Kleingartner said.

"That kind of information is so important so we don't have to go through eight years of grow outs to see if we've got this resistance in this hybrid,"

he said. "We can just do it on a very molecular basis."

The sunflower mapping venture is the latest of several plant genome projects.

In 2008, a group of researchers led by Washington University in St. Louis mapped the corn genome and posted its research on the Internet. The \$29.5 million project, funded by the National Science Foundation and the U.S. Energy and Agriculture departments, will allow seed companies to tweak the genome to increase the plant's productivity.

Scientists also have mapped the genes of the black cottonwood tree, rice, the potato, the pinot noir grape and a weed called *Arabidopsis thaliana*.

Sunflowers are a nearly \$14 billion a year industry, with some 32 million metric tons produced worldwide each year, according to the National Sunflower Association. In the United States, they're grown primarily in North Dakota, South Dakota, Kansas, Minnesota and Colorado. They're used primarily for cooking oil, although the seeds also are found in snacks and other products.

The family's genome is 3.5 billion letters long, which is slightly larger than the human genome.

Researchers say mapping the family's entire sequence could lead to crop improvement, weed control and the development of wood-producing varieties that could be used for flooring and other products. Increasing the complex sugars in Silverleaf's stalk would make it a viable feedstock for ethanol, Rieseberg said.

"It's extremely drought tolerant and grows very, very tall," he said. "And what's remarkable is that it's pretty much wood from bottom to top, and yet it's an annual."

The nation's 170 operating ethanol plants can produce 10.6 billion gallons of the fuel per year, according to the Renewable Fuels Association, but the vast majority of that fuel comes from corn. Growing criticism from a diverse alliance of cattle ranchers, grocers and environmentalists about using corn for fuel has prompted the industry to look at nonfood feedstocks such as switchgrass, corn stover and wood waste.

Congress had hoped ethanol production from nonfood sources would reach 100 million gallons in 2010, but companies are expected to fall far short of that goal.

More information: National Sunflower Association:
<http://www.sunflowernsa.com/>

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Citation: Sunflower DNA map could produce plants for fuel (2010, January 22) retrieved 25 April 2024 from <https://phys.org/news/2010-01-sunflower-dna-fuel.html>

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