



BAYER BREEDERS ARE OPTIMIZING THE FATTY ACID PROFILE OF OIL PLANTS

New oilseed rape varieties for healthier deep-fat frying

The demand for healthy food is on the rise, even among fast-food fans. To make deep-fried foods less harmful to the heart and circulatory system, researchers at Bayer are developing oilseed rape varieties whose oil is particularly suitable for use at high temperatures. Unlike previous products, it contains none of the trans-fatty acids that nutritionists warn us not to consume.

Chicken wings, donuts and of course French fries: fried food is so delicious – but so unhealthy. This is because these crispy culinary treats are normally fried in hydrogenated vegetable oil. Hydrogenation – a chemical hardening process –

improves the shelf life of conventional vegetable oils.

It also increases their smoke point so they can be used at temperatures above 100 degrees Celsius without breaking down. But the trans-fatty acids resulting

from the hardening process are harmful to human health. They have a negative effect on cholesterol levels and increase the risk of arteriosclerosis, cardiovascular disease, intestinal disorders and diabetes. This is one of the reasons that nutrition-



Scrupulous selection: in the greenhouse, oilseed rape expert Steven Engelen examines flowers from selected plants.

al experts have long warned against the health risks of fried food.

Bayer's oilseed rape experts want to make deep-frying healthier

Countries such as Denmark, Iceland, Switzerland and Austria imposed statutory limits on the use of trans-fats in processed foods years ago. There has even been a ban on their use in the catering industry in the U.S. cities of Philadelphia and New York. As more and more people around the world seek to maintain a balanced diet, the demand for healthy alternatives to conventional frying oil continues to grow.

Teams from Bayer Innovation Centers in both Ghent, Belgium, and Saskatoon, Canada, are therefore working to develop new hybrid rape varieties with optimized fatty acid compositions. "We work closely with leading cooking oil manufacturers

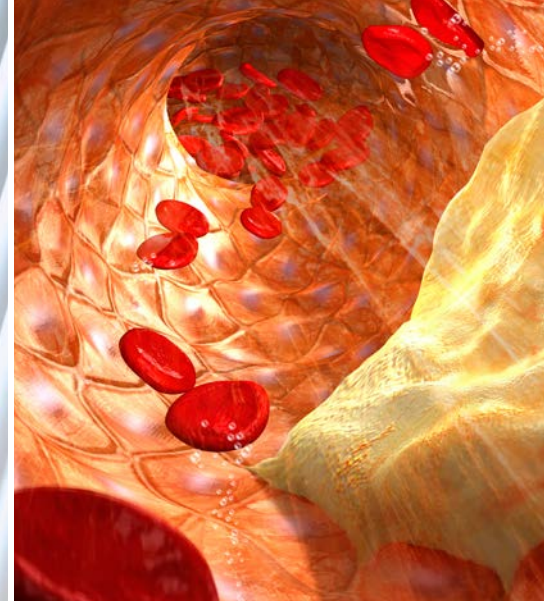
to breed varieties tailored to the requirements of major food producers," explains Steven Engelen, Program Leader from Trait Research at Bayer. "Our goal is to develop rapeseed oil which can be safely used for frying without having to be hydrogenated beforehand."

Rapeseed oil is generally considered to be a particularly high-quality cooking oil, because of its high vitamin content and favorable fatty acid profile. It contains high levels of monounsaturated fatty acids like oleic acid and polyunsaturated fatty acids such as omega-3 fatty acids. These have a positive effect on cholesterol levels and cardiac health.

Thanks to its high levels of oleic acid, rapeseed oil is relatively stable and can be stored at room temperature for prolonged periods. However, rapeseed oil also has to be hydrogenated before frying to enable it to withstand the high temperatures – or, at least, it did until now.



Late starter: rapeseed oil's career as a food did not take off until 1974. It is now considered one of the highest-quality edible oils, and is used for salads, for deep-frying and in margarines.



A golden freight encased in a black shell: ripe rapeseeds (photo, left) contain large quantities of oil. If these seeds come from the new plants developed by the Bayer research team led by Steven Engelen (photo, center), the oil will contribute to a healthy cholesterol level in blood and help prevent arteriosclerosis (image, right).

In 2009, Bayer researchers were involved in an international research project to sequence the oilseed rape genome. They are now developing new varieties on the basis of the knowledge gained from some of the 30,000 genes that are found in the genome sequence. These varieties will be marketed under the strong global brand InVigor™.

High level of oleic acid makes rapeseed oil healthier

Engelen's team used this state-of-the-art knowledge to optimize the oil producing

pathway and eliminate the need for hydrogenation. The aim was reached to develop plants which right from the field produce oil that is suitable for prolonged deep-frying without hydrogenation. Bayer in collaboration with global food company Cargill markets oilseed rape plants whose oils contain up to 65 percent monounsaturated oleic acid and less than 3 percent linolenic acid, known as HOLLI oilseed rape (High Oleic Low Linolenic). This oil is naturally stable, does not need hydrogenation and therefore does not contain harmful trans-fatty acids,

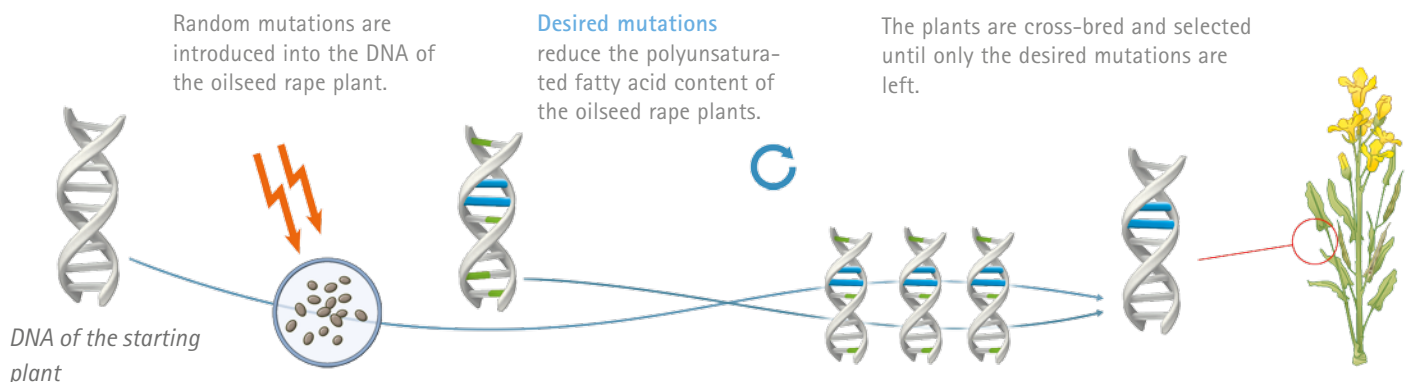
but nonetheless retains all of the other healthy properties.

Oilseed rape is the second most important oilseed in the world after soybeans

With a record annual harvest of 72 million tons worldwide in 2014, oilseed rape is the second most important oilseed after soybeans, according to figures from the U.S. Department of Agriculture. Together with Canada, China and India, the European Union is one of the leading oil-

Genetics for better French fries

The oilseed rape plant's DNA determines its properties. The starting plant produces a lot of polyunsaturated fatty acids. During hydrogenation for deep-frying purposes these are turned into unhealthy trans-fats. The solution: Bayer scientists optimized the crop's DNA to reduce the polyunsaturated fatty acid content.



seed rape-producing regions in the world. The oilseed rape boom began in 1974 when varieties suitable for producing cooking oil first came onto the market. Dubbed 'zero oilseed rape', these forms contained virtually none of the anti-nutrients such as erucic acid that had made rapeseed oil unpalatable and even harmful to health.

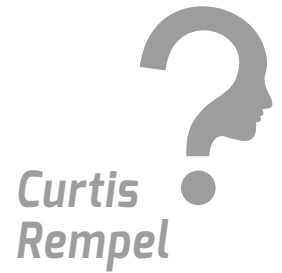
This was followed by double-zero oilseed rape varieties in the mid-1980s which had the additional benefit that their defatted rapeseed meal – a byproduct of oil extraction – was free from glucosinolates, the bitter compounds that give mustard its sharp flavor. Because the new oilseed rape varieties were developed in Canada, they were marketed under the name Canola (short for Canadian oil, low acid).

North America is committed to innovative frying fats

"We meet the specific requirements of major oil-producing customers all over the world," explains Tom Schuler, Global Seeds & Traits Marketing Lead for Oilseed Rape at Bayer. "When it comes to innovative oil profiles for deep-frying fats, North America is currently our most important market. But if this trend continues, Europe and Asia could become equally important." Bayer is working together with the

"High potential"

research spoke with Dr. Curtis Rempel, Vice President of the Canola Council of Canada, about the new InVigor™ H hybrids. North America is currently the most important market for rapeseed oil varieties with health benefits.



How can Bayer's oilseed rape varieties contribute to a healthier diet?

They offer the catering trade a healthier frying oil with improved functionality. In the food industry, the oil can be used to manufacture numerous processed foods from crackers and cookies to breakfast cereals. It can also be used in low-fat products and oil sprays. We expect to

see a significant rise in the demand for naturally stable, healthy plant-based cooking oils in the future.

What role will HOLLi rapeseed oils play in the future?

Cooking oils play an important role in a healthier lifestyle – for instance in the prevention and treatment of obesity, diabetes and cardiovascular diseases.

global food company Cargill in marketing oilseed rape varieties with improved oil profiles.

The aim is to continuously improve the latest hybrid oilseed rape varieties. "Our most recent HOLLi developments are currently still regarded as specialist

products. Nevertheless, we are convinced that specialty oils will break into the mainstream market," says oilseed rape researcher Engelen. "In the future, all conventional rapeseed oils available on the market could have an optimized fatty acid profile." ■

Plants with the optimized DNA produce seed with a lower linolenic acid content and higher oleic acid content.

The seed for the optimized oilseed rape plants is planted.

The new oilseed rape plants produce oils with a high oleic acid content that are much more suitable for deep-frying.

