

Scientists develop palm-like oil from non-tropical plants

Written by nguyen

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Using GM techniques to change the activity of a plant enzyme could convert unsaturated oils in the seeds of a temperate plant to the more saturated kind usually found in tropical plants like palm oil, new research suggests.

According to the research, published in the Proceedings of the National Academy of Sciences (PNAS), the new tropical-like oil has properties more like margarine than do temperate oils, but without the trans fatty acids commonly found in margarine products.

"These results demonstrate that manipulation of a single enzyme's activity is sufficient to convert the seed oil composition of Arabidopsis from that of a typical temperate plant to that of a tropical palm-like oil," said John Shanklin from the U.S. Department of Energy's Brookhaven National Laboratory.

Plants from temperate climates (e.g., canola, soybean, and sunflower), contain predominantly 18-carbon unsaturated fatty acids in its seed oil, while tropical plants (e.g. palm) contain higher proportions (approximately 50 percent) of 16-carbon saturated fatty acids.

The research could offer an alternative to unpopular trans fats. Trans fatty acids are a by-product of hydrogenated fats, which have increasingly been linked to heart problems.

"Scientists have known for a long time that the ratio of saturated to unsaturated fatty acids plays a key role in plants' ability to adapt to different climates, but to change this ratio specifically in seed oils without changing the climate is an interesting challenge," explained Shanklin. *"Our group sought to gain a better understanding of the enzymes and metabolic pathways that produce these oils to find ways to manipulate the accumulation of fats using genetic techniques."*

Shanklin and his co-workers focused their research on an enzyme called beta-ketoacyl-acyl carrier protein (ACP) synthase II (KASII) that normally elongates fatty acid chains by adding two carbon atoms. These longer 18-carbon chains are normally acted on by enzymes that

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desaturate the fat. By reducing the levels of KASII the scientists aimed to prevent the chain lengthening and thereby increase the level of saturated fats in the plant seeds.

Using a technique known as RNA-interference (RNAi) the researchers to reduce enzyme activity, thereby allowing the plants to accumulate more saturated fats than was normal.

Shanklin and colleagues used the model plant Arabidopsis, and report that the genetic manipulations that reduced KASII activity resulted in a seven-fold increase in 16-carbon unsaturated fatty acids - up to an unprecedented 53 per cent - in the temperate Arabidopsis plant seed oils.

"It is fascinating - and potentially very useful - to know that we can change the oil composition so drastically by simple specific changes in seed oil metabolism, and that this process can occur independently from the adaptation to either tropical or temperate climates," said Shanklin.

And since the oil would not contain any genes in it, there is some debate about whether the oil would necessarily be considered [GM](#) in its own right.

Shanklin also pointed out that the technology could be used in reverse to allow scientists to engineer more heart-healthy food oils.

"The development of new plant seed oils has several potential biotechnological applications," he said.

The research could offer an alternative to palm oil, an oil that is becoming increasingly attractive to food processors due to the fact that they are free from unpopular trans fats. Trans fatty acids are a by-product of hydrogenated fats, which have increasingly been linked to heart problems.

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Last year, pressure group Friends of the earth (FoE) published its 'Oil for Ape Scandal' study, which claimed that that without urgent intervention the [palm oil](#) trade could cause the extinction of the orang-utan ape within 12 years.

The problem, according to FoE, is that over 89 per cent of all palm oil is produced in Malaysia and Indonesia, and as a result almost 90 per cent of the orang-utan's habitat in Indonesia and Malaysia has now been destroyed.

Source: *Proceedings of the National Academy of Sciences*

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"Modulating seed beta-ketoacyl-acyl carrier protein synthase II level converts the composition of a temperate seed oil to that of a palm-like tropical oil"

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By **Stephen Daniells**, 13-Mar-2007.

Source: <http://www.foodnavigator-usa.com/>