

# Helping wean the chemicals industry off crude oil

**C**SIRO scientists have joined one of the world's largest biotechnology consortia to help develop crops which produce oils for the chemicals industry as sustainable alternatives to those derived from the world's non-renewable stocks of crude oil.

The Industrial Crops producing added value Oils for Novel chemicals (ICON) project, is a four-year global collaboration involving leading scientists from 23 partner organisations in 11 countries.

The project aims to develop high-yield, sustainable oilseed crops for the chemicals industry and provide substantial environmental benefits, energy savings and economic returns.

ICON is modifying the non-food oilseed crops, *Crambe abyssinica* and *Brassica carinata*, so they produce wax esters, which are much more resistant to high temperatures and pressures than normal plant oils. This will substantially increase the industrial uses of the plants' oils.

"We aim to contribute to ICON by discovering novel genes for wax synthesis, which could be produced in crops," says senior CSIRO Plant Industry scientist, Dr Allan Green.

## Australia well placed

"CSIRO is also well placed to assist ICON improve *Crambe*'s seed yield to enable it to become a more competitive industrial crop," says Allan.

"We're already developing crops to provide renewable industrial raw materials to replace petrochemicals through the Crop Biofactories Initiative – a joint venture between CSIRO and the Grains Research and Development Corporation."

Earlier this year CSIRO announced it would use safflower as its first biofactory platform crop because it is hardy, easy to grow, widely adapted and easily isolated from food production systems.

"Essentially, safflower is 'ready-to-go' as an industrial crop platform within Australia," Allan says. "ICON complements our Crop Biofactories Initiative, as it will help develop the next generation of high-yield, non-food crop platforms for production of industrial products, and will serve as an ice-breaker to show how agriculture can contribute to a sustainable industrial economy in a post-petroleum future."

While there are a range of alternatives

to using fossil fuels for energy, only biological materials can replace petroleum-derived lubricants and industrial chemicals.

Processing petroleum also uses a lot of energy that could be saved if crops pro-

duced oils designed for specific needs.

Farmers could also receive premium prices for these new crops, which would take up a minimum of valuable food production land. ■



Safflower has been chosen as the first biofactory platform crop. (Photo: Carl Davies, CSIRO)

## THE AIM OF THE ICON PROJECT

Replacing fossil oil with renewable resources is perhaps the most urgent need and the most challenging task that human society faces today. Cracking fossil hydrocarbons and building the desired chemicals with advanced organic chemistry usually requires many times more energy than is contained in the final product. This means using plant material in the chemical industry does not only replace the fossil material contained in the final product but also saves substantial energy in the processing.

Of particular interest are seed oils which show a great variation in their composition between different plant species. Many of the oil qualities found in wild species would be very attractive for the chemical industry if they could be obtained at moderate costs in bulk quantities and with a secure supply. Genetic engineering of vegetable oil qualities in high yielding oil crops could, in a relatively short time frame, yield such products. The ICON project aims at developing such added value oils in dedicated industrial oil crops mainly in the form of various wax esters particularly suited for lubrication.

This project brings together the most prominent scientists in plant lipid biotechnology in an unprecedented world-wide effort to produce added value oils in industrial oil crops within four years. The project will also develop a tool box of genes and an understanding of lipid cellular metabolism for rational designing of a vast array of industrial oil qualities in oil crops. As the GM technologies used in the project are often controversial, it is crucial that ideas, expectations and results are communicated to the public and that methods, ethics, risks and risk assessment are open for debate. The keywords of our communication strategies will be openness and an understanding of public concerns.

The ICON project is coordinated by SLU, the Swedish University of Agricultural Sciences.