



Visit to international companies processing and distributing speciality oils, July 2002

**A travel report for the Rural Industries Research
and Development Corporation**

by Margaret Campbell

October 2002

RIRDC Web Publication No W02/026
RIRDC Project No TA012-49

© 2002 Rural Industries Research and Development Corporation.
All rights reserved.

ISSN 1440-6845

Travel report – Visit to international companies processing and distributing speciality oils, July 2002
Publication No. W02/026
Project No. TA012-49

The views expressed and the conclusions reached in this publication are those of the author and not necessarily those of persons consulted. RIRDC shall not be responsible in any way whatsoever to any person who relies in whole or in part on the contents of this report.

This publication is copyright. However, RIRDC encourages wide dissemination of its research, providing the Corporation is clearly acknowledged. For any other enquiries concerning reproduction, contact the Publications Manager on phone 02 6272 3186.

Researcher Contact Details

Ms Margaret Campbell
CLIMA
University of Western Australia
35 Stirling Highway
CRAWLEY WA 6009

Phone: 08 9343 4559
Fax: 08 9380 1080
Email: mcc@cyllene.uwa.edu.au
Website: <http://clima.uwa.edu.au>

RIRDC Contact Details

Rural Industries Research and Development Corporation
Level 1, AMA House
42 Macquarie Street
BARTON ACT 2600
PO Box 4776
KINGSTON ACT 2604

Phone: 02 6272 4539
Fax: 02 6272 5877
Email: rirdc@rirdc.gov.au
Website: <http://www.rirdc.gov.au>

Published on the web in October 2002

Reason for Travel

The reason for the travel was to explore the potential export market for some of the novel oilseeds currently under investigation in the RIRDC funded project on Alternative Oilseeds (UWA 47A). Telephone and email contacts had been made with several international companies processing and distributing specialty oils in England, France and Finland and there was interest in our likely oil products. It was believed to be advantageous to visit each of the companies and meet with the key personnel in order to acquire an appreciation of the size and scope of their operations and the potential markets. Additionally, the trip facilitated meetings with researchers working with the different species, which enabled an exchange of information, ideas and germplasm. Meeting with the different organizations encouraged the probability of future commercial involvement and collaborative research work. Samples of oil extracted from lines of *Mathiola incana* were given to the companies who expressed a particular interest, for their evaluation. In particular, the potential markets for oilseed crops such as *Echium sp.*, Golden Linseed and *Mathiola incana*, which are part of a newly proposed project, were investigated.

Person Traveling

Name: Margaret C. Campbell

Position: Research Officer working on the Alternative Oilseeds project. Project located at CLIMA, University of Western Australia, Perth.

Broad Itinerary

1. Dr. David Coupland and Clifford Spencer at Springdale Crop Synergies, Bridlington, Yorkshire. (Specialty oil company)
2. Peter Sedgbeer and Nimrit Hayre at Statfold Seed Oil Developments, Tamworth, Leicestershire (Specialty oil company).
3. Julie Goult and Philip Nichols at John K. King, Colchester, Essex (Specialty oil producers).
4. Stanislas Crouzier at SPRINT, Limagrain, Chappes near Clermont Ferrand, France. (Limagrain is Europe's largest International oilseed company)
5. Karita Alen at Camelina Ltd, University of Helsinki, Finland (Europe's major Camelina product marketer)

Alternative Oilseeds Travel Report: visit to Overseas Companies

Summary

Four companies and one research organisation were visited during the trip to the England, France and Finland. The three companies in England differed in their size and interests in the alternative oilseeds. However, they had some interests in common. The French and Finish contacts were only interested in one of the alternative oilseeds; *Camelina sativa*.

The seed oil of *Echium plantagineum*, (well known in Australia as the weed Paterson's curse), is valued because of its content of steariodonic acid, a proven anti-inflammatory. However, the desired oil content of the seed for commercial production would be around 30% with a concentration greater than 13% of steariodonic acid. The wild types collected from Northampton WA revealed an oil content of the seed of 20 – 25% and a steariodonic acid concentration of around 12.7%. This has the potential to be a very valuable product. Improvements in the oil content and the steariodonic acid level would be a realistic research objective. The seed would also need to be certified grown organically to attract the best price. AQIS regulations would currently prohibit the import of germplasm of *Echium*.

Linseed seed and oil has a substantial market in UK and Europe. Growers are paid a subsidy in addition to the yield price. Golden seeded varieties grown organically attract added premiums. The requirements are that the oil content of the seed should be greater than 35% and the concentration of alpha linolenic fatty acid (Omega 3) in the oil should be at least 45%. Analysis of the oil of lines grown at the UWA Field Station in Perth has indicated that oil content levels vary between 34 and 40% and usually, the concentration of alpha linolenic acid is in excess of 50%.

Camelina has a very limited market, although the potential is there for it to become very big. Cold pressed, it is a pleasant tasting and healthy oil, which can be sold as food oil in the UK and Europe due to past precedence. *Camelina* Ltd in Helsinki is working hard promoting the seed and the oil, to gain acceptance in the market. Lines with high linolenic acid levels (38% minimum) and low (below 2%) erucic acid levels are needed. There is a limited established market in the cosmetic industry.

The UK, Europe and America have a market for high erucic acid industrial oils. Currently, *Crambe* is grown widely to fulfil this niche. *Crambe* seed with low glucosinolate concentrations would be of particular interest due to the possible use of the meal for stock feed. *Brassica campestris* and *B. carinata* lines are of interest as alternative sources of high erucic acid oils.

The market for borage, sold as Starflower Oil in health food shops, has re-established after a previous over supply. However, borage requires a longer cooler season to reach its full potential as a crop, than is generally available in the wheat belt of WA. It is better suited as a crop for the more temperate areas of South Australia, Tasmania or New Zealand.

Travel Report

An explanation of the primary purpose of the travel

The primary purpose of the travel was to explore the feasibility of exporting specific oilseeds to Europe and the UK by meeting with people involved in marketing the oils. To assess whether there was sufficient demand and if the economics justified the effort of growing them. The travel was necessary to determine which of the species being evaluated in the project had the most market appeal and which others might have market potential in the future.

Initially, the Alternative Oilseeds Project had concentrated on research into the suitability of the different oilseed species as crops for southern Australia. The results had indicated which of the species had real potential for growth in southern Australia, those that had potential in other areas within Australia. Results of country trials had shown that several species gave equal to or better yields than Canola grown in the same conditions. However, the current markets for the alternative oilseeds are at best, very limited in Australia. Investigations via the internet had revealed that there is increasing interest in some of the alternative oilseeds in the UK and Europe and consequently, a growing market.

Companies such as John K. Kings contract farmers in America and New Zealand to grow oilseeds eg crambe for industry and other such as linseed and borage for health food supplements. Oilseeds are also imported from Canada to fill market demands. Because of the subsidy system in UK and Europe on certain crops, it is not an economically attractive proposition for the alternative oilseeds to be grown locally. These could be grown in Australia and exported to overseas markets. Once a consistent export market has been established and the crops are being grown, then efforts could be made to create more local markets.

Major achievements/ findings of the travel

Contacts were established with key personnel in companies involved in the production and selling of exotic oilseed products. Mutual interest was expressed in future collaborative work, both in areas of research and in the production and selling of the oilseeds. Information was gathered on the minimum requirements for each of the most marketable oilseeds, eg erucic acid concentration in Crambe, Omega 3 fatty acid concentration in Linseed, the steariodonic acid level in the seed oil of *Echium plantagineum* and the percentage oil content of the seeds generally. Other information acquired included current prices paid for the different oilseeds landed in England, which features added value to the crops eg premiums paid for seed certified organically grown or low glucosinolate content in the seed of Crambe which would facilitate the use of the meal as stock feed.

Benefits/significance to the grantee, and her work

The travel gave me the opportunity to broaden my interest in the project from pure and applied science through to an investigation of the commercial potential of the different species. I had discovered that there were limited market opportunities for the species being evaluated in the project in Australia. However, the research had shown that the cropping potential was there and the farmers had indicated considerable interest. All that was needed were markets. The trip allowed me the chance to investigate some of the current potential markets overseas and to meet with oil producers who understood the commercial requirements and were involved in supplying oils to the markets. It also clarified the directions for future research into the alternative oilseeds.

Benefits/significance to the rural industry

The travel clarified which of the oilseeds are in demand internationally and the requirements for the different oilseed products. Different companies have requested samples of some of the seeds to evaluate for specific characteristics in a step towards potentially contracting farmers in Australia to grow specific oilseed crops or to contracting through Elders for the supply of oil or seed. It is anticipated that this will give farmers more options in their choice of crops and allow for greater flexibility in rotations etc. This will have benefits in the control of weeds, for disease breaks and for generating alternative sources of income for the rural industry.

Recommendations to RIRDC and the rural industry

The market for health food products in Europe and England has shown that research into particular specialty oilseeds is strongly recommended. Of particular interest currently, is high linolenic golden Linseed, also plant species with oil containing stearidonic acid eg *Echium plantagineum*. The breeding of high value specialty oilseeds to fit the requirements of overseas market is highly desirable.

Camelina sativa products, this includes the seed, meal and oil, are being marketed in Finland as very healthy and tasty additions to the diet. Camelina oil is registered as food oil in Europe and the UK. However, much research work remains to be done in selecting and breeding for lines with particular fatty acid profiles to enhance their nutritional value, eg to improve the Linolenic acid levels and reduce the erucic acid levels. As this crop is ideally suited for growth in Australia, support for this research is highly recommended.

Appendix

Details of the meetings with each of the companies:

1. Meeting with Springdale Crop Synergies

Met with Dr. David Coupland & Clifford Spencer at Springdale Farm. Springdale is involved in the technology of various novel crops. They are producing a range of crops, many of which are shared with the RIRDC project. They arrange seed production of the novel crops for interested farmers. These include Crambe, Echium, borage, linseed, and Camelina, also, hemp for oil.

Clifford Spencer also has a strong interest in pulses and is a good contact for CLIMA. He is a member of the pulse panel advising on project funding as part of the research program administered by National Institute of Botany. Lupins resistant to *Septaria* and with low alkaloid content would be a high priority for future collaborative research.

The oilseeds being promoted at present with good market prospects are Echium, borage, Crambe and linseed. At the moment, market signals for Camelina oil are not clear.

Echium plantagineum (Paterson's curse) is of distinct interest to Australia as the oil has special qualities. It not only has good levels of alpha and gamma linolenic acids but its real value appears to be in its content of the anti inflammatory stearidonic acid with levels of 15% being a desired concentration and an oil content in the seed of 30%. The oil of the wild local lines sampled from Northampton in Western Australia tested at 13% stearidonic acid levels, which would indicate that substantial progress could be made in selection for increasing this level. At harvest the crop is desiccated, then swathed and left to dry before harvesting. They report less seed loss than with borage and it may be that their local selections have less tendency to shatter. They have offered to supply us with some seed of one of their lines. However, Aqis regulations may preclude this possibility.

The market for borage oil (Starflower oil) has re-established after a previous over supply. Starflower oil is common in the health food shops. They are reporting an oil content of 30% of the seed and the levels of GLA (24%) are similar to those found in WA. They suggest despite that the levels of GLA being double than those found in Evening Primrose, the health benefits do not reflect this. It would appear that borage oil also contains an inhibitory factor. Harvesting demands that the crop is swathed and shattering is a problem. They have selected lines with more shattering resistance, which would be made available to us on proper request with proper Aqis clearances.

England has a market for industrial oils and high erucic acid oils such as Crambe and our *Brassica campestris* selection are of interest. They mentioned that Crambe with a low glucosinolate content would be desirable. This would be of general benefit, as it would make the residual meal more useful as stock feed.

Linseed has a ready market in Europe, both for the oil and for the whole seed for its health benefits. Golden linseed is of particular interest. UK is currently importing Canadian linseed, landed at \$435 per ton (approx.). Larger seeded lines, particularly golden may well attract a premium in the health market. They stated that there is no problem with deterioration of the oil in the seed over time and the shelf life of the oils would be improved by the addition of anti oxidants eg vitamin E.

It was believed that Camelina oil would not be of use as a cooking oil as the long chain linolenic acid would break down too quickly leaving the oil rancid. It is yet to be passed as food oil but they said there should be no real problems. In the food market, it probably has more of a place in salad dressings.

Website

<http://www.springdale-group.com>

2. Meeting with Statfold Seed Oil Developments

Present at the meeting: Nimrit Hayre & Peter Sedgbeer

Statfold seeds supply The Body Shop with a range of different plant derived oils for various cosmetic purposes. They also supply Sainsburys with different oils. They have 7 cold press expellers and are investing in a super critical CO2 extraction facility for novel oilseeds. They process more than 40 different types of oil for food, cosmetic and pharmaceutical purposes. In all, they process more than 2000 tons per year. Oils of particular interest are hemp, linseed, borage, Echium and they are interested in supplies of Camelina and rice bran oil.

Most supplies come from Canada & USA. The biggest interest currently is in hemp oil. Hemp needs warmth to fulfil potential oil content etc. It need not be certified organically grown. Seed landed from Canada is purchased for \$850 per ton approx. They are currently buying 40 tons per month.

Flax oil (from linseed) is supplied to Sainsbury's. The requirement is that 45% of the oil should be Omega 3 fatty acid. Linseed landed from Canada cost approximately \$1,000 per ton, with a premium for the golden linseed. Larger seed is preferable. Linseed must have low cadmium levels to qualify (Canadians quote their linseed has low cadmium levels) and oil content should be greater than 35% of the seed. The seed must be certified grown organically to EEC regulations. Non-organically grown seed would attract approx half or less.

Borage is again in demand after a period of over supply and there is a ready market for Starflower oil. Statfold seeds have a contract for 40 tonnes of borage seed, which cannot be fulfilled at this time.

Echium needs to have greater than 10% Stearidonic acid in the oil. Could expect upto \$4,500 per ton landed, but probably \$1200 is more realistic. Price would be influenced by being organically grown or not. This is a species that we need to devote more attention in regard to its oil content, fatty acid profile, harvestability etc. Improvement in oil content and stearidonic acid content provide a realistic research objective. They would appreciate 3 – 5 kg to test.

Statfold have customers interested in Camelina, providing a guaranteed supply of 100 to 200 tons is available. Camelina seed need not necessarily be organically grown. Price of seed landed could be \$1000 to \$1200 as a minimum. Statfold would require 5 – 10 kg initially to test before they would commit to a contract.

There is big interest in Rice Bran oil, which contains phytosterols. The husk can come from white or brown rice.

They are interested also in Meadowfoam (*Limnanthes alba*).

Clearly all prices quoted are subject to negotiation with the commercial partners.

3. Meeting with John K. King & Sons

Met with Philip Nichols & Julie Goult

Julie has recently joined the company and is in charge of crop production globally; Kings have connections with producers in UK, USA, New Zealand & Europe. Phillip is manager of the end product production and distribution and is involved mostly with supply chain contracts.

John K. King was originally established in 1793, dealing with basic agricultural commodities. It started to diversify in 1982 and the initial involvement was with HEAR (High Erucic Acid Rapeseed) but this has been expanded to include other novel oil crops which could be grown on set aside land. Kings is owned by Allied British Foods, which is the largest company dealing with food products in the UK. In 1999, Kings purchased an oil extraction facility, which increased their product production.

Kings currently grows the largest acreage of borage in the world, which runs into several thousand acres. They are pioneers in the crop and have been involved in the development of particular lines.

They grow Camelina and probably have the largest amount of land devoted to Camelina in the world. However, this runs into 100's of acres not 1,000's. They agree that Camelina is a very good crop, which has excellent oil, but cannot find much of a market. It is used for cosmetic and pharmaceutical purposes only. The yield aim is for 1 ton/acre (about 2.4 tonnes/hectare). Camelina is approved as a food due to grandfather rights, which is a history of being used for a food before 1998. Locally grown Camelina attracts a price of about \$620 per ton. However, the meal is not approved for stock feed. Camelina attracts no subsidy for growers. They would appreciate about 100gms of a couple of lines for testing.

Linseed growers are paid a subsidy of \$240 per acre for growing it. It is very popular with an increasing market; oil from brown seeded varieties is usually put into capsules, oil from the golden seeded varieties is either sold as oil or the whole seed is sold. Golden seeded varieties attract an added premium of approx. \$150 per ton but it must be organically grown. This year 20,000 acres will be sown to linseed in UK. However, the biggest market is in organically grown linseed of both types. Prices paid for the organic linseed seed is \$1350 to \$2000 per ton approx. landed from Canada.

There is great interest in echium seed due to its stearidonic acid content, which needs to be greater than 12 – 13% of the oil, although ideally, it should be around 20%. Kings also need to know the free fatty acid levels and the fatty acid profiles generally. They would like 100gms from 3 – 4 locations to test at Kings.

Brassica campestris 98112 is of great interest to them because of its high erucic acid content (55%). Currently, they grow vast areas of crambe in America to fulfil that market. The company is the largest supplier and producer of high erucic acid oils in the UK. They grow HEAR and import crambe oil through their office in North Dakota. (Query glucosinolate levels in Crambe and HEAR?) HEAR has reported levels of erucic acid of around 45%. In this context a line of *Brassica campestris* whose susceptibility to blackleg may not be a problem for crops grown under license in the UK, would be desirable. *B. campestris* (Turnip rape) is accepted and has a tradition as a grain crop in the UK. They would like about 100gms to grow on their land for comparison. The RIRDC program in Perth also has isolated *Brassica carinata* lines with reasonably high levels of erucic acid and which are resistant to blackleg.

Additional oils that Kings produce include Evening primrose oil & Blackcurrant oil.

Amongst pasture species, they were interested in Red Clovers as a source of Phytoestrogens.

4. Meeting with Stanislas Crouzier of SPRINT (Limagrain)

SPRINT is not a company, but a group of companies (mainly cooperatives), a kind of association, to fund a research program for high erucic oilseed rape, and to put in place production contracts for its members. The members are located in their own organisations (for example Stanislas is a Limagrain employee, located at Chappes close to Clermont Ferrand).

SPRINT was started in the early 1990's. Using set a side land, on which non-edible crops could be grown, the investment initially, was with High Erucic Acid Rapeseed (HEAR) which would have 66% erucic acid. Gene manipulation breeding could raise this to 68 – 69%, (90 – 92% is theoretically possible). In old lines of rapeseed, the level of erucic acid content varied between 45 and 46%. However, seed yields in HEAR are lower and so the farmers would need a premium to encourage them to grow it. Biotech developed varieties, which had 60 – 66% erucic acid when grown in the lab, but not in the field. Now there is legislation against GM crops, which means no market for the crop and no money to pay for the research. Canada, USA & Poland have large stocks of HEAR. Mandatory Contractual Relationships are in place to protect the farmers. A farmer would not be contracted to grow a crop without a contract with an end producer. The main crops that Limagrain is involved in are Sunflower and Rapeseed in Europe and Soy in USA.

Camelina sativa went into production in 1998, but the market is small in Europe, mostly in the cosmetic industry. Seed was collected in Germany, Hungary and Austria. There are probably old stands surviving in Turkey and Uzbekistan. Amongst all the lines there are good adaptations to various conditions. Of importance is the yield, 2.5 tons/ha is needed. In trials, 4.5 ton/ha was achieved, however, that was unusual, a more normal seed yield is 1.3 - 2 tons/ha. There seems to be no apparent reason for the variation in seed yields, although temperature at flowering could be critical. The unpredictability of the yields of *Camelina* discourages farmers from growing it, to compensate; a higher price for *Camelina* seed is needed. The diseases that have attacked *Camelina* include *Botrytis* and *Sclerotinia*, possibly due to the wet warm conditions. There has been little damage by insects. Currently, only 40 – 50 ha are being grown annually.

In 1998, the French Authorities were approached for permission the use *Camelina* oil as a food additive. An investigation revealed that between 1860 and 1940 *Camelina* oil was used as a food especially during the war. In 1950's it was used as a source of lighting fuel. Permission was granted for the use of refined *Camelina* oil as a food for human consumption. It was promoted as an additional source of alpha linolenic acid. However, due to health scares eg mad cow disease, the consumers are very wary of new products and require more evidence that it was suitable as a food.

There has been collaborative research with INRA and other organisations into the use of *Camelina* seed and meal as a stock feed. It was found that dairy cows fed *Camelina* seed gave better, more nutritious milk and better spreading butter. Cattle can have up to 15% *Camelina* in their diet. In beef cattle fed with crushed *Camelina* seed, the fat in the carcass stays whiter longer. However, in 1973, an EEU directive related to undesirable products in animal feed banned the use of *Camelina* seed as an animal feed, but the oil is acceptable for animal consumption. There seems to be no good reason for this. The value of the seed meal as a stock feed is critical to the economics of *Camelina* as a crop. The ex warehouse price for *Camelina* seed is \$1300 for inorganically grown seed and approx. double for organically grown seed. It is sold in 500 kg bags.

Extension information concerning *Camelina* is minimal. At this point in time a conference or workshop would be very valuable but the economics and level of research into the crop do not justify the expense. A possibility would be to organise an event through the "Association for the Advancement of Industrial Crops" in the US. That association covers all kind of crops that may become alternative crops. A specific session or a speech, or posters could be the first steps to identifying researchers and commercial organizations interested in *Camelina sativa*.

5. Meeting with Camelina Ltd

Met with Karita Alen, Managing Director of Camelina Ltd.

The adaptation and crop management of *Camelina sativa* was studied in an European Union project between 1995 and 1998. The Department of Plant Production of the University of Helsinki, Finland was involved in this study. Based on the knowledge gained during the project, Camelina Ltd was founded in 1998 and the company began contract farming *Camelina sativa* in 1999.

Camelina Ltd main office is located at the University of Helsinki.

Camelina sativa (L. Crantz.), false flax or Gold of Pleasure, is an ancient oilseed crop, which has been grown in Europe since the Iron and Bronze ages. Over 50% of the fatty acids of cold pressed Camelina oil are polyunsaturated: 40% alpha linolenic acid and 15% linoleic acid. These fatty acids are known to reduce the LDL cholesterol level in the blood and are good for cardiovascular health. The oil contains many natural antioxidants, eg tocopherols, which help to stabilize the oil and make it suitable for cooking. The vitamin E content of Camelina oil is approx. 10 mg/100g.

Camelina Ltd. markets a number of food products based on Camelina seed. The pure cold pressed virgin oil can be used in all forms of cooking and meals including salad dressings, sauces and gravies, also for frying and baking. Research by the company has revealed that the oil is relatively stable and does not breakdown and turn rancid when heated. Camelina Relish and Camelina Dressing are multipurpose products that can be used to enhance the taste of hamburgers, meatballs, fried and smoked fish etc. The golden seed of Camelina and the crushed oilseed cake, which remains after the oil has been removed by pressing, can be used in baking, mixed with breakfast yoghurt, cereals and fruit or sprinkled on salads. The products come in two types depending on whether the crop has been grown organically or conventionally.

The market for the Camelina Ltd products is new and very small and much promotion will be needed to increase their market acceptability. Limited acreage is being sown to *Camelina sativa* in Finland and new lines with improved levels of alpha linolenic acid are being sought that will fit the growing conditions. It would be a valuable exercise for the RIRC project on alternative oilseeds to collaborate with Camelina Ltd in the research into the effects of environment on the oil content and fatty acid profiles of different lines of *Camelina sativa*. In Finland, the crops are grown in summer; conditions include long day lengths combined with warm temperatures. In Australia, the same crops are grown in winter where conditions include short day lengths combined with cool temperatures.

Website

<http://www.camelina.fi/engl.htm>