

# IENICA

Interactive European Network for Industrial Crops and  
their Applications

**INFORM-IENICA is a project funded under the Fifth Framework Programme by DG XII  
of the European Commission**

## REPORT FROM THE STATE OF THE UNITED KINGDOM

**Update Report  
July 2004**



---

Prepared by James Copeland  
Agricultural & Rural Strategy Group  
Central Science Laboratory  
[j.copeland@csl.gov.uk](mailto:j.copeland@csl.gov.uk)  
+44 (0) 1904 46 24 96

# CONTENTS

---

Methodology	3
Executive Summary	3
<b>Oil Crops</b>	<b>4</b>
<b>Fibre Crops</b>	<b>8</b>
<b>Carbohydrate Crops</b>	<b>11</b>
<b>Speciality Crops</b>	<b>13</b>
<b>Tables and Figures:</b>	
Table 1: Production of oil crops in the UK (1999-2003)	4
Table 2: UK vegetable oil production	4
Table 3: Research projects undertaken in the UK on oil crops	5
Table 4: Production of fibre crops in the UK (1999-2003)	5
Table 5: Potential natural fibre requirements	7
Table 6: Research projects undertaken in the UK on fibre crops	8
Table 7: Production of starch in the UK (1999-2003)	8
Table 8: Starch data for industrial products by crop for 1998	9
Table 9: Starch data for industrial products by crop for 2003	10
Table 10: Research projects undertaken in the UK on carbohydrate crops	11
Table 11: Starch data for industrial products by crop from 01/01/1998 to 31/12/1998	12
Table 12: Starch data for industrial products by crop from 01/01/2003 to 31/12/2003	12
Table 13: Research projects undertaken in the UK on carbohydrate crops (1997–2005)	12
Figure 1: Estimated tonnage of speciality crops in the UK (2002)	13
<b>References</b>	<b>14</b>

## ACKNOWLEDGEMENT

---

This work was funded under the IENICA workstream of the IENICA-INFORRM project. IENICA is the Interactive European Network for Industrial Crops and Applications. The overall project is funded by the Fifth Framework Programme of the European Commission under the Quality of Life Programme. This project is a development of the FAIR Programme (FP4)-funded IENICA project.

# METHODOLOGY

---

This report is an update of the initial study conducted in 1998. The four key areas; oils, fibres, carbohydrates and speciality crops were researched for data on production, industrial applications and current and future developments of the crops.

The report was prepared from various information sources, including publications, internet sites, associations and contact with manufactures and producers.

## EXECUTIVE SUMMARY

---

Since the first national report was completed in 1998, the UK has come forward in its production and utilisation of non-food products. Many new products have been commercialised, and other crop areas have continued to grow.

### **Oil Crops:**

Oils crops have changed dramatically with the commercial introduction of Crambe in 2001. This new oil provides erucamide, a slip agent used in the production of plastic bags. Linseed areas have continued to decline as affect of Agenda 2000 reform. The UK produces approximately 9,600 tonnes of biodiesel each year, the majority of which is derived from waste oil in the frying industries but some 2,000ha of oilseed rape was grown in 2003 specifically for biodiesel.

### **Fibre Crops:**

The production of fibre crops has not fluctuated for the area of hemp, but a sharp drop in the area of flax has been seen. Just over 2,000ha each of flax and hemp were grown in 2003, with the majority of fibres going abroad for processing. Between 6,000 and 10,000 tones of hemp derivatives are used each year for horse bedding, and this market is expected to increase to 42,000 tonnes by 2010.

### **Carbohydrates:**

Wheat is the only crop grown in the UK for starch. The majority of starch produced is derived from imported feedstocks. Approximately 4% of UK wheat goes for starch production, but only 3,640 tonnes of wheat is directly used in non-food crop products. The wheat starch is processed into a completely biodegradable and non-toxic packaging material used to protect many electrical goods.

### **Speciality Crops:**

Market information on the trade and prices of essential oils is not easily available in the UK owing to the fact that these markets are low volume, high price markets, and detail market information is held in confidence.

# OIL CROPS

## 1.1 Production

The principal crops grown in the United Kingdom (UK) for their oils for industrial uses are Oilseed Rape (winter & spring), Linseed and Crambe.

**Table 1: Production of oil crops in the UK (1999-2003)**

		1999	2000	2001	2002	2003
<b>Oilseed Rape</b>	<i>Hectares '000</i>	347	265	306	306	367
<b>Winter</b>	<i>Tonnes '000</i>	1149	805	828	1099	1312
	<i>Yield (t/ha)</i>	3.3	3.0	2.7	3.6	3.6
<b>Oilseed Rape</b>	<i>Hectares '000</i>	17	29	61	19	55
<b>Spring</b>	<i>Tonnes '000</i>	34	43	101	39	106
	<i>Yield (t/ha)</i>	2.1	1.5	1.7	2.1	1.9
<b>Linseed</b>	<i>Hectares '000</i>	213	74	31	11.1	31.4
	<i>Tonnes '000</i>	302	43	39	14	55
	<i>Yield (t/ha)</i>	1.42	0.58	1.23	1.3	1.7
<b>Crambe</b>	<i>Hectares '000</i>	0	0	0.5	1.1	3.5
	<i>Tonnes '000</i>	0	0	1.25	2.93	8.99
	<i>Yield (t/ha)</i>	0	0	2.5	2.5	2.5

Source: Defra Statistics, 2003

### Oilseed Rape

The area of oilseed rape has fluctuated since 1999 with a sharp drop in 2000 due to Agenda 2000 (see below). Since then the area has been slowly increasing as rapeseed becomes the predominate break crop in cereal production. High Erucic Acid Rape (HEAR) grown on set-aside land for non-food crops<sup>1</sup> (Appendix 1) has increased from approximately 5,300 ha in 1998 to in excess of 20,200ha in 2003. Diversification into such novel crops is increasingly been seen as one method of maintaining the viability of land-based sector through alternative revenue streams.

### Linseed

The area of linseed significantly decreased from 213,000 hectares in 1998 to 31,000 hectares in 2001 (effect of Agenda 2000) with a switch from linseed to oilseed rape as the main break crop.

### Crambe

Crambe has been produced commercially in the UK since 2001, and has seen the area grown increase from approximately 500ha in 2001 to nearly 3500ha in 2003, this area is expected to increase, with a potential market for 20,000ha to be grown.

**Table 2: UK vegetable oil production ('000 tonnes)**

	1998	1999	2000	2001	2002
<b>Linseed oil production</b>	39.7	28.1	29	14.6	8.8
<b>Rapeseed oil production</b>	669.4	634.1	614.6	572.2	586.2
<b>Linseed oil imports</b>	2.1	1.7	1.3	1.5	5.5
<b>Rapeseed oil imports</b>	97.1	195.8	190.6	198.5	134.9
<b>Linseed oil exports</b>	7.6	9.9	10	5.6	2.5

Source: Mielke, T. 2003

<sup>1</sup> The data is not comprehensive as crops grown on other land types can not be readily identified.

The UK oilseeds market has undergone a major change since 1999 with a reduction in linseed areas and increase in oilseed rape. There are three key factors that have effected the production of linseed and oilseed rape in the UK: the implementation of Agenda 2000, the price of the crop and weather conditions during the production seasons. All three are interlinked and with Agenda 2000 and weather affecting production and prices.

The adoption of Agenda 2000 meant that rapeseed and linseed would receive the same Area Aid Payment as cereals. This was part of the decoupling of crop specific production orientated payments. The realignment of rapeseed and linseed payments with that of cereals took place from 2000, with payments becoming equal to cereals by 2002. A reduction was made for harvest 2000, with a further reduction occurring in 2001 and again in harvest 2002 where equalisation occurred. This realignment had a negative impact on the gross margin of rapeseed and linseed compared with cereals, as reflected in the area changes outlined above.

**Table 3: Area payments for arable crops (£) (1999 – 2002)**

	1999	2000	2001	2002 <sup>2</sup>
Cereals	54.34	58.67	63	63
Oilseeds	<sup>3</sup>	81.74	72.37	63
Linseed	105.1	88.26	75.63	63
Proteins	78.49	72.5	72.5	72.5
Set-aside	68.83	58.67	63	63

Source: Nix, J. 1999

Linseed was particularly affected as it had a higher area aid payment than rapeseed (see Table 3) and so had a proportionally larger fall in value than rapeseed. As a consequence from harvest 2000, the price of rapeseed and linseed became an even larger proportion of the revenue earned from the crop.

The price of rapeseed increased relative to linseed, which, given that rapeseed has a higher yield and is harvested earlier than linseed meant that producers gave preference to rapeseed as a break crop.

**Table 4: Gross margins for oilseed rape and linseed (£/ha) (1999–2002)<sup>4</sup>**

	1999	2000	2001	2002
Winter oilseed rape	570	475	455	390
Spring oilseed rape	430	420	385	320
Linseed	485	335	270	245

Source: Nix, J. 1999-2002

Rapeseed prices have risen strongly since the 1999/00 season. In 1999/00 the average ex-farm price was £110, in 2000/01 it was £126, in 2001/02 it was £143 and in 2002/03 it was £162. This has improved the rapeseed gross margin. Consequently rapeseed has become an attractive crop. The fact that it is a break crop that can help control weeds, pests and diseases in subsequent cereal crops and spreads the workload due to it being planted and harvested earlier than cereals are added advantages.

<sup>2</sup> And Subsequent years

<sup>3</sup> Different calculation (separate oilseed yield and euros/tonne)

<sup>4</sup> All figures are based on average yields for that year

## 1.2 Industrial Applications

Oilseed rape, linseed and crambe are all processed in the UK. Each crop requires a different crushing and refining technique depending upon the end use(s) of the oils.

### Oilseed rape

The majority of oilseed rape oil produced in the UK is can be found in products for human consumption. Oilseed rape oil can also be used in the production of rapeseed methyl ester (RME). Although the majority of biodiesel produced in the UK has come from waste oil from the frying industries. In 2003 the UK grew 2,000 hectares of oilseed rape specifically for the production of biodiesel. Customs and Excise figures indicate that current biodiesel production in the UK is running at just under 800 tonnes per month (9,600 tonnes per annum), but only 26% of this is sold as a blend (95% mineral: 5% biodiesel).

The biodiesel industry has been encouraged by a duty rate for biodiesel of 25.82 pence per litre (ppl), which was introduced in the 2002 Budget and came into effect on 26 July 2002. This is a reduction of 20 ppl compared with the price of ultra-low sulphur diesel. The Chancellor announced in Budget 2003 that the Government would reduce the duty rate for bioethanol by 20 ppl compared with ultra-low sulphur petrol with effect from 01 January 2005. Currently land may be planted with biofuel crops and continue to receive set-aside payments. As part of the recent round of CAP reform, an additional annual aid payment of 45 Euros is available under the Energy Crops Aid Payment<sup>5</sup> for growing biofuel crops on non set-aside land. All these measures aim to improve and encourage the use of alternative fuel sources, as seen by areas being grown specifically for biodiesel.

### Crambe

Crambe was first grown commercially in 2001; prior to this it was being grown for experimental purposes. Crambe is only processed by Croda Oils<sup>6</sup> at Hull for its High Erucic Acid (HEA) content. Erucamide derived from High Erucic Acid Rape (HEAR) is used as a 'slip agent' in plastic production. Vegetable oil derived HEA oils have significant potential in all such markets. Consumption of HEA in the EU was 40,000 t/annum in 2000 and is predicted to increase to 55,000 t by 2005<sup>7</sup>.

### Linseed

Linseed oil has been used traditionally within paints, wood protection products, soap, putty, printing ink and linoleum. With the decrease in areas grown, the market for linseed oil has declined, with very little data now available on specific markets. In 2003, the UK linseed area was 31,400 hectares compared with 11,100 ha in 2002. Production in 2003 was 55,000t compared with 14,000t in 2002 (source: Defra Stats Notice 04/04).

World production of linseed oil in 2002 was approximately 1 million tonnes; EU-15 usage of linseed oil in the technical and chemical industries reached 60,000 tonnes in 1998 and is expected to be 55,000 tonnes in 2004. (source: IENICA)

*Linoleum:* Linoleum is made of natural materials: linseed oil, resins, wood, cork powder, calcium, vegetable pigments and hessian (jute). There are new interests in this material and the European market was expected to increase from 36 million m<sup>2</sup> in 1995 to 56 million m<sup>2</sup> in 2003. Linoleum has particular benefits in 'high-tech' situations in being anti-static. One kilogram of linseed oil is required for each 1m<sup>2</sup> of linoleum.

---

<sup>5</sup> Any crops grown for energy purposes are eligible except sugar beet.

<sup>6</sup> Croda Chemicals is the largest producer of natural-based speciality chemicals in the UK.

<sup>7</sup> [ienica.csl.gov.uk/crops/eruca.pdf](http://ienica.csl.gov.uk/crops/eruca.pdf)

### 1.3 Current and Future Developments in Oil Crops

Dual purpose hemp provides both fibre and seed oil. In 2003 a UK company<sup>8</sup> grew 310 acres of dual hemp. The seeds were been crushed for the oil to make into oil capsules (high in Omega 6 & Omega 3), pesto and ice cream, or hulled<sup>9</sup> and used in culinary salad markets.

New markets for oil derivatives have been identified from research into vegetable-based (oilseed rape) cleaning agents within the UK printing industry. The UK is the second largest market for cleaning solvents after Germany, with a volume of 190,000 tonnes in 2001 and a value of £570 million.

The UK polymer market amounts to 2.7 million tonnes per annum, but less than 0.1% of production is from bio-based materials. Functional additives such as slip agents from crambe, and polyurethane's already exist, but with 99.9% of polymers being derived from reducing feedstocks of fossil fuels, it is likely that biopolymers will move to fill any gaps in this mass market.

**Table 5: Research projects undertaken in the UK on oil crops (1995 – 2005)**

Organisation	Title	Project Duration
SAC Agronomy Department	Cost-benefit analysis, including life-cycle assessment, of oils produced from UK-grown oilseeds compared with mineral oils	1995-1998
SAC	Novel Oil Crops	1999-2001
SAC	Development of <i>Myrica gale</i> as a source of natural products in toiletries and household care products	2002-2005
University College London & University of Durham	Innovative manufacture of plant-derived plastics	1996-1999
University of Warwick	Low-cost synthesis and evaluation of polymers prepared from oilseed rape and <i>Euphorbia lagascae</i> oils	1998-2000
University of Birmingham	Fixed oilseed products from novel crops by compressed carbon dioxide extraction routes	1999-2002
Sheffield Hallam University	Evaluation of comparative energy, global warming and socio-economic costs and benefits of biodiesel	2001-2002
University of Warwick & ADAS	Vegetable oils as polymer feedstocks: chemical modification, materials formulation and economics	2000-2003
Scottish Executive Environment and Rural Affairs Department (SEERAD)	<i>Achillea millefolium</i> (Yarrow) as the source of high quality essential oils and plant material for natural antioxidants	2000-2003
Central Science Laboratory	Antimicrobial and pesticidal properties of herb oils	2000-2003
CNAP – University of York	Functional genomics in marine algae to discover genes that can be used to produce docosahexaenoic acid in oilseed crops	2002-2005
University of Manchester	Antioxidant-based industrial products from oats	2002-2005
Institute of Offshore Engineering	Vegetable oils for offshore drilling operations	To 2005

Source: NNFCC. 2004

<sup>8</sup> Springdale Crop Synergies Limited

<sup>9</sup> The removal of the outer covering of the seed

# FIBRE CROPS

## 2.1 Production

Fibre crops grown in the UK are primarily flax and hemp.

**Table 6: Production of fibre crops in the UK (1999-2003)**

		1999	2000	2001	2002	2003
<b>Flax</b>	<i>Hectares</i>	15,500	11,000	4,680	2,717	2,078
	<i>Tonnes</i>	24,112	17,112	7,280	4,227	3,233
	<i>Yield (t/ha)</i>	1.6	1.6	1.6	1.6	1.6
<b>Hemp</b>	<i>Hectares</i>	1,517	2,298	2,556	1,413	2,225
	<i>Tonnes</i>	7,585	11,490	12,780	7,065	11,125
	<i>Yield (t/ha)</i>	5	5	5	5	5

Estimates of UK Flax fibre crop areas (data from Arable Area Payments Scheme). (Note. Flax and hemp were only incorporated into AAPS regime from 2001 so prior this data is from the Farm Management Pocketbook, (they were previously supported under the EU flax and hemp regimes))

### Hemp

Despite the development of new technical markets for fibres in the automotive sector, the UK area of hemp has continued to fluctuate over the past three years, but with no dramatic increases. The area currently stands at 2,200 hectares, virtually all of which is produced in the east of England. Of this 310 acres of dual hemp<sup>10</sup> was grown in 2003.

### Flax

The area of UK flax production continues to decline as a result of decreasing processing capacity and the low value associated with the crop compared with other potential crop options. The current flax area is just over 2000 ha, three quarters of which is produced in the east of England. This is a decline from 15,500 ha in 1999.

## 2.2 Industrial Applications

**Table 7: Potential natural fibre requirement (tonnes per year)**

	EU		UK	
	2000	2010 (forecast)	2000	2010 (forecast)
Car composites (compression moulding)	28,300	100,000	4,000	14,000
Animal bedding			8,000	42,000
Speciality paper (chemical pulping)	40,000	80,000		8,000
Car composites (injection moulding)		60,000		6,000
Graphic paper (chemi-mechanical pulping)		700,000		70,000
<b>TOTAL</b>	68,300	940,000	12,000	140,000

Source: Karus and Kaup. 2002

### Bedding

The UK horse bedding market is estimated to be worth some £70 million per annum. According to Hemcore (John Hobson, personal communication) 250,000 tonnes of wood shavings and 6,000-10,000 tonnes of hemp derivatives are used each year to meet this market. The potential UK market for natural fibres as animal bedding is estimated to be 42,000 tonnes by 2010 (Table 7).

<sup>10</sup> Springdale Crop Synergies Limited

## Specialist Paper

Approximately 40%, and decreasing, of the hemp fibre produced in the UK is used in the specialist paper industry; there are now only three mills remaining in Western Europe (2 in France and 1 in Spain) for processing hemp fibres for specialist paper.

## Composites

At present the European composites market is worth £3,300 million per annum, with a volume of 1,540,000 tonnes per annum. The UK share of this market is 240,000 tonnes (Sims and Bishop, 2001). Three main fibres are used in the composites industry: fibreglass (35-40% of fibres), carbon (30% of fibres) and Aramid<sup>11</sup> (25% of fibres). Natural fibres<sup>12</sup> are thought to represent 5-10% of the market. The European automotive industry is slowly increasing the amount of hemp being used as amounts of high quality fibres being produced increases. The UK fibre industry is looking to compete in this area, and with new technology aims to produce the high quality fibre required.

## Future Developments - Construction Industry

A project pioneered by the Suffolk Housing Society in 2000 used hemp to create two experimental homes. Hemp and hydrated lime were mixed on site before being poured into wooden shuttering which, when removed, provides the walls and floors of the new timber framed houses. The hemp has been supplied by a French company Isochanvre, which specialises in processing the material for use in buildings. The Building Research Establishment have examined the sustainability, economic and environmental differences between the two construction methods.

## 2.3 Support for Fibre

Hemp being produced in the UK requires the grower to have a licence from the Home Office. The Home Office offers guidance on the location of commercial hemp planting due to the traces of tetrahydrocannabinol<sup>13</sup> (the narcotic element) that can sometimes be found in commercial hemp.

Flax and hemp are aided under the Arable Area Payments Scheme if grown on eligible land that meets the normal land eligibility rules. Payment rates vary in different parts of the UK.

**Table 8: Arable Area Payment Scheme values for Flax and Hemp per Ha**

	£
<b>England</b>	250.14
<b>Scotland</b> Less-Favoured Area	217.93
Non Less-Favoured Area	237.18
<b>Wales</b> Less-Favoured Area	215.88
Non Less-Favoured Area	222.16

Source: Rural Payments Agency, 2003

Aid may also be payable via the Fibre Processing Aid Scheme on the tonnage of fibre produced by an authorised primary processor. The most recent rate payment in 2002 was £58.50 per tonne<sup>14</sup>.

<sup>11</sup> Aramid is a group of lightweight but very strong heat-resistant synthetic aromatic polyamide materials widely used in textiles and plastics.

<sup>12</sup> Composites markets rely on the bast fibre.

<sup>13</sup> The UK tetrahydrocannabinol level allowed is 0.2%

<sup>14</sup> 4<sup>th</sup> Declaration 1<sup>st</sup> September 2002 – 31<sup>st</sup> December 2002, <http://www.defra.gov.uk/farm/acu/fibres/fibres.htm>

## 2.4 Current and Future Developments in Fibre Crops

**Table 9: Research projects undertaken in the UK on fibre crops (1995–2006)**

<b>Organisation</b>	<b>Title</b>	<b>Project Duration</b>
University of Leeds	Ultrastructure studies on UK grown plants with potential as sources of industrial fibre	1995-1999
University of Oxford	Toward a novel approach to modify lignins in plants	1999-2001
BioComposites Centre	Optimised non-wood pulp production and effluent treatment	2000-2003
John Innes Centre	Genetic determinism of Maritime Pine pulp and paper properties	2000-2004
	Enzyme discovery in hybrid aspen for fibre engineering	2001-2005
De Montfort University	Short fibre flax for high value textile uses	2002-2005
QinetiQ	Development of Thermoplastic Biocomposites	2002-2006
Brunel University	Novel processing of cereal straws for fibre packaging	2003-2006

Source: NNFCC, 2004

# CARBOHYDRATE CROPS

## 3.1 Production

Starch produced in the UK from UK feedstocks is sourced from wheat.

**Table 10: Production of starch in the UK (1999-2003)**

		1999	2000	2001	2002	2003
<b>Total Wheat Production</b>	<i>Hectares '000</i>	1847	2086	1635	1996	1837
	<i>Tonnes '000</i>	14867	16704	11580	15973	14288
	<i>Yield (t/ha)</i>	8.0	8.0	7.1	8.0	7.8
<b>Wheat Flour for Starch</b>	<i>Tonnes '000</i>	846.2	739.1	734.2	762.4	771.9

Source: Defra Statistics. 2003

Approximately 4% of the UK wheat crop (although this varies annually depending upon the size of the crop) goes for industrial uses. The UK starch and glucose industry produces around 0.8M tonnes of product each year, with over 80 % in the form of glucose. To produce this, around 630,000 tonnes of wheat, and a further 770,000 tonnes of imported maize is used. Maize starch manufacture is based entirely upon imported raw materials.

The UK does not have a share of the EU potato starch quota. Hence, there is no commercial potato starch production in the UK, and is seen as a major barrier to work in this area.

## 3.2 Industrial Applications

The British Starch Industries Association do not collect or collate statistics or data on the starch industry, though this has been specified as something that industry needed (Pers. Com. B Price of the British Starch Industries Association)

Heygates Ltd. is the only producer of wheat flour specifically for packaging in the UK. Heygates Ltd. supply Green Light Products with an estimated 2,600 tonnes of wheat flour per annum from 3,640 tonnes of wheat. This flour is processed into starch for packaging, and new products such as board from starch. (Personal Communication: L Pearson, Heygates Ltd.)

Green Light Products manufacture Eco-bloc, that looks and functions like standard expanded polystyrene packaging used to protect fragile items and electrical goods, like computers. Unlike polystyrene however, the new wheat-based material is completely biodegradable and non-toxic. It can be disposed of by composting or by recycling like cardboard waste, and comes from an entirely sustainable source. Green Light currently has about a 35% market share of the loosefill sector in the UK, as well as exporting small amounts to Continental Europe. The UK loosefill market is estimated to be £7m.

An EU Starch Refund Scheme began on 30<sup>th</sup> June 1993, to encourage the use of European Community produced starch, which might otherwise be replaced by cheaper starch imports. A production refund is payable to users of starch which is manufactured from maize, wheat, potatoes or rice, in free circulation within the EU, or derived from products in free circulation; and used to make eligible products - usually for the industrial, chemical and pharmaceutical sectors (see table 11 & 12). In order to qualify for EC aid, starch processors must be registered with Rural Payments Agency and hold a valid refund certificate. Detailed rules for starch production refunds as laid down in Commission Regulation (EEC) No 1722/93.

**Table 11: Starch data for industrial products by crop from 01/01/1998 to 31/12/1998**

	<b>Quantity (tonnes)</b>	<b>Amount (£)</b>	<b>Price per tonne (£)</b>
Maize	30589.82	242096.99	7.91
Potato	692.43	4058.54	5.86
Wheat	10168.77	40439.17	3.98

Source: Rural Payments Agency, Newcastle. 2004

**Table 12: Starch data for industrial products by crop from 01/01/2003 to 31/12/2003**

	<b>Quantity (tonnes)</b>	<b>Amount (£)</b>	<b>Price per tonne (£)</b>
Maize	175575.92	1662424.57	9.47
Potato	23360.65	219316.36	9.39
Wheat	73057.60	760555.22	10.41

Source: Rural Payments Agency, Newcastle. 2004

### 3.3 Current and Future Developments in Carbohydrate Crops

**Table 13: Research projects undertaken in the UK on carbohydrate crops (1997–2005)**

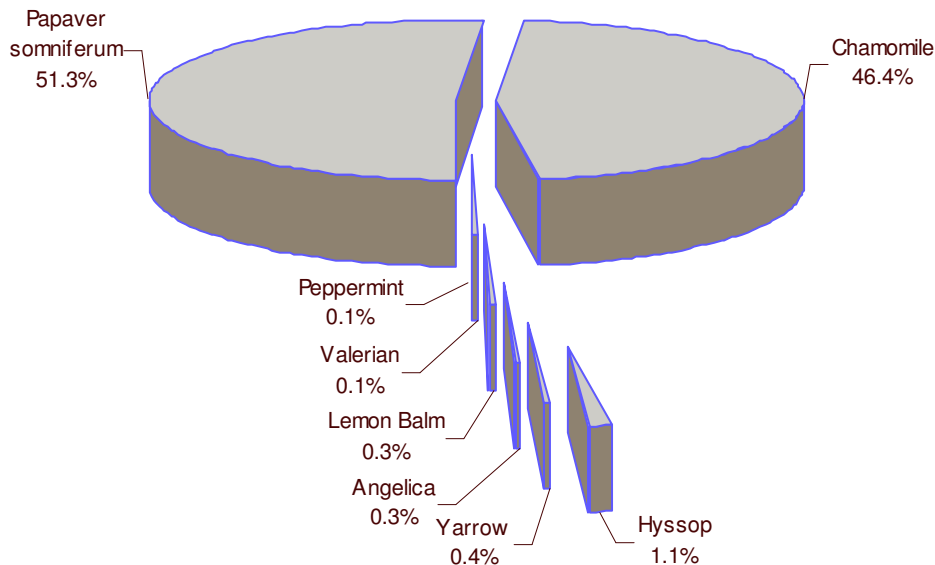
<b>Organisation</b>	<b>Title</b>	<b>Project Duration</b>
University of Edinburgh	Manipulation of D-enzyme activity and starch metabolism in potato	1997-2000
SAC	Effect of growing conditions on the properties of starches isolated from UK wheats	1998-2000
John Innes Centre & University of Edinburgh	The roles of plastidial starch modifying enzymes in determining starch quantity and quality in plants	1999-2002
John Innes Centre	Starch synthase specificity and the control of starch composition and structure	1999-2002
University of Nottingham	Starches for use in film formation	2000-2003
BioComposites Centre	Value added products from wheat straw	2000-2003
University of East Anglia, Rothamsted Research & Institute of Food Research	Molecular mechanisms of wheat protein elasticity in relation to food processing and biomaterials	2001-2004
British Potato Council	Sustainable GB Potato Packaging	2003-2004
ADAS	Cereals starches as dry lubricants	2002-2005

Source: NNFCC, 2004

# SPECIALITY CROPS

Market information on the trade and prices of essential oils is not easily available in the UK owing to the fact that these markets are low volume, high price markets, and detail market information is held in confidence. Moreover, markets are susceptible to competition and overproduction.

**Figure 1: Analysis of speciality crops grown on set-aside land in the UK (2002)**



Source: Data adapted from UK Rural Payments Agency data

*Papaver somniferum* (Opium Poppy) has been grown in the UK since 2002. The area grown has dramatically increased from 466 in 2002 (initial commercial year) to 1509 hectares in 2003 to meet production contracts. Cultivated poppies are the source of opium for morphine and codeine. The seeds are also used in confectionery and bakery trades, and high quality artist paints, cosmetics and medicines.

The area of chamomile being produced in the UK has increased significantly since 1998 (see Appendix 1). The area grown has increased from 43 hectares in 1998 to 175 hectares in 2002. The chamomile area tripled in 2001 after advice given under European Agricultural Guidance and Guarantee Fund (EAGGF) Programme. This increase has flooded the market and caused damage to existing chamomile growers with a 50% reduction in price. It is estimated that 50ha would be adequate to supply the UK market (Pers Com. The English Chamomile Company).

Springdale Crop Synergies Ltd, estimated that in 2003 the company had grown 30 hectares of *Camelina sativa* for the cosmetic industry (used for its moisturising and anti-inflammatory action); and 150 hectares of Borage for its high content of omega-6 (n-6) fatty acid - gamma-linolenic acid (18:3, GLA). Gamma-linolenic acid is predominantly used as a dietary supplement.

Natural dyes are still used but in very limited quantities; synthetic dyes account for approximately 99.9% of all dyes, as they have been proven more fast and uniform. A prominent UK dye supplier suggested that *Isatis tinctoria* (Woad) is the only crop that could be supplied from UK feedstock, although it would have to compete with French imports.

## REFERENCES

---

Department for Environment, Food and Rural Affairs (Defra) Statistics. (2003)  
<http://statistics.defra.gov.uk/esg/>

Karus M. and Kaup M., 2002, *Natural fibres in the European automotive industry*, in *Journal of Industrial Hemp* 7(1): 117-129.

Mielke, T. (2003). *Oil World Annual 2003*. ISTA Mielke Hamburg, Germany.

Nix J., 1999 to 2002, *Farm Management Pocketbook*.

NNFCC. (2004) <http://www.nnfcc.co.uk/>

Rural Payments Agency. (2003/2004) [www.rpa.gov.uk](http://www.rpa.gov.uk)

Sims G. and Bishop G., 2001, *UK polymer composites sector: foresight study and competitive analysis*. DTI Report, October 2001.

## Appendix 1:

The following table shows data on the UK non-food crops grown on set-aside land. The data is not comprehensive. Non-food crops grown on set-aside land can be readily identified but not those grown on other land types.

Crop	Area (ha)					
	1998	1999	2000	2001	2002	2003
Oilseed Rape	22,793	127,470	48,858	34,376	61,534	61,908
High erucic acid rape	5,320	14,909	20,764	13,190	13,588	20,234
Linseed	2,253	3,600	2,192	606	731	1,916
Other non-food crops*	361	299	45	725	2,943	6,460

\* Primarily:

Crambe				499	1,171	3,596
Oat					494	
Triticale					477	
Papaver somniferum					466	1,509
Chamomile	43	55	29	118	175	167