



Industrial Hemp as Oil Seed Crop

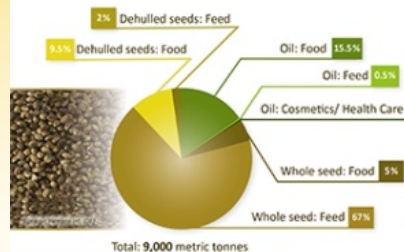
Markets, Properties and Products

Niels de Beus
nova-Institut, Germany



A natural biorefinery Hemp

Seeds

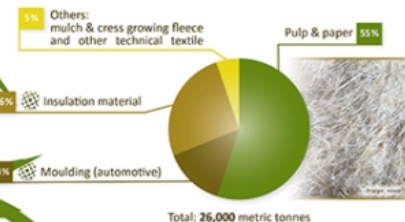


Flower

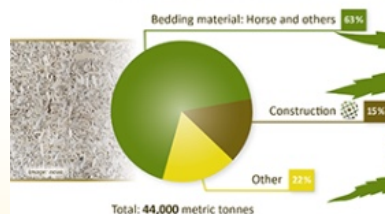
- Pharmaceutical: THC, CBD



Fibre



Shivs



Leaves

- Feed
- Pharmaceutical
- Tea & Infusions



Products currently being researched within MultiHemp

- Other products to be developed:
 - Phytosterols and waxes (from fibre processing dust).
 - Liquid biofuels (from hemp residual biomass).

Data from 2013, on 2010 harvest in Europe (EiHA 2013).
Available at:
<http://eiha.org/imedia/2014/10/13-06-European-Hemp-Industry.pdf>

MultiHemp

The MultiHemp project aims at developing hemp genotypes with enhanced traits suitable for diverse cultivation environments and to provide improved feedstock for a wide array of innovative end products generated within an integrated biorefinery. For more information, see <http://www.multihemp.eu>.

The MultiHemp project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement No 311849.



Roots

Revitalise soil with nutrients.
Provide aeration of soils.



FIBRA

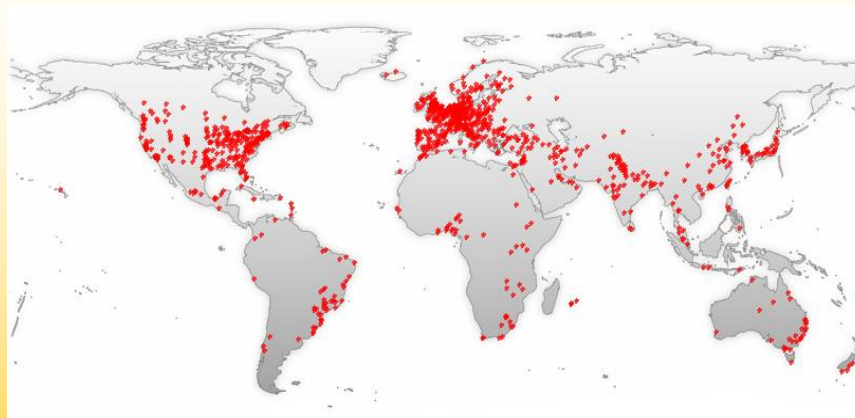
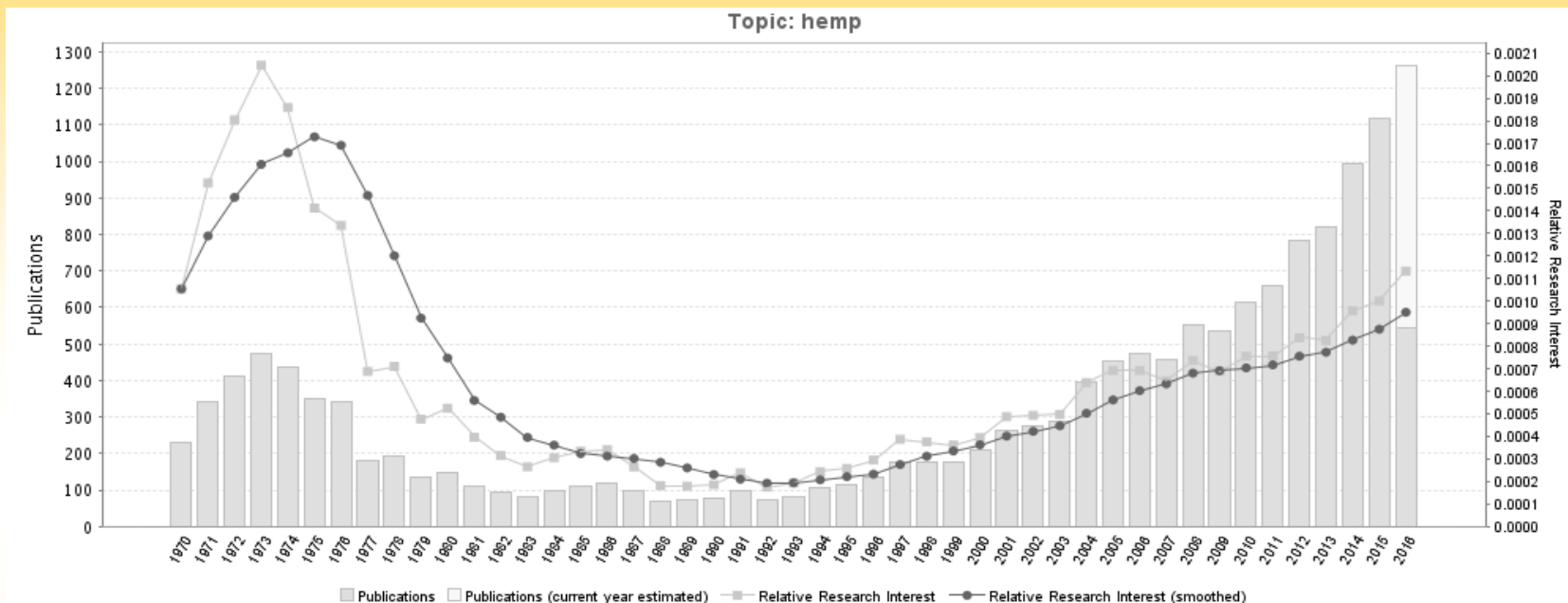
The main target of the FIBRA project is to link the research activities carried out in both the European Union and China on natural fibre crops, to provide a long term vision on future common research activities on fibre crops and to improve researchers' training opportunities. For more information, see <http://www.fibrafp7.net>.

The FIBRA project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement No. 311965.





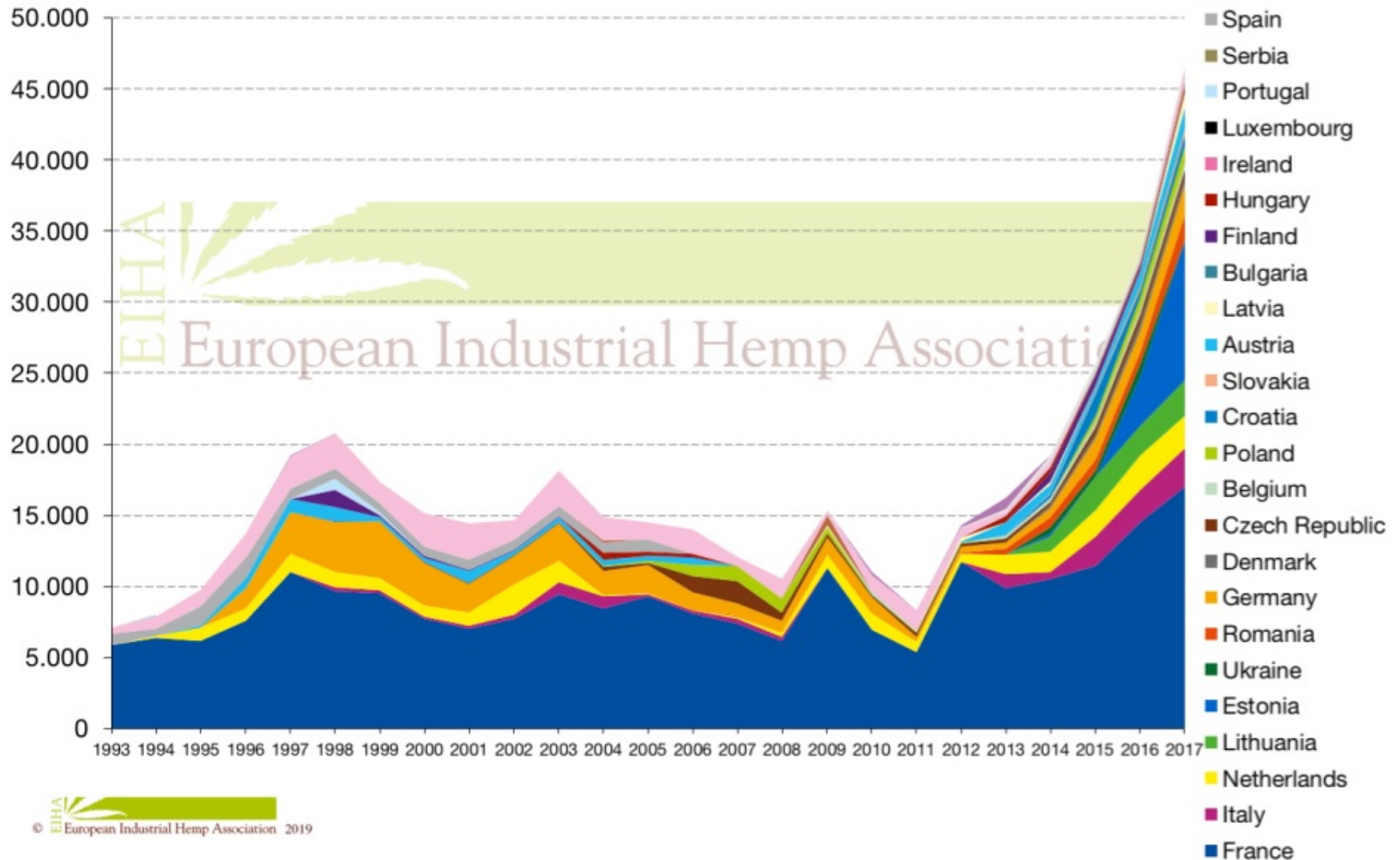
Research & Publications



Source: ww6.gpubmed.com HempConsult (2016)

Hemp Cultivation Area in the EU (ha)

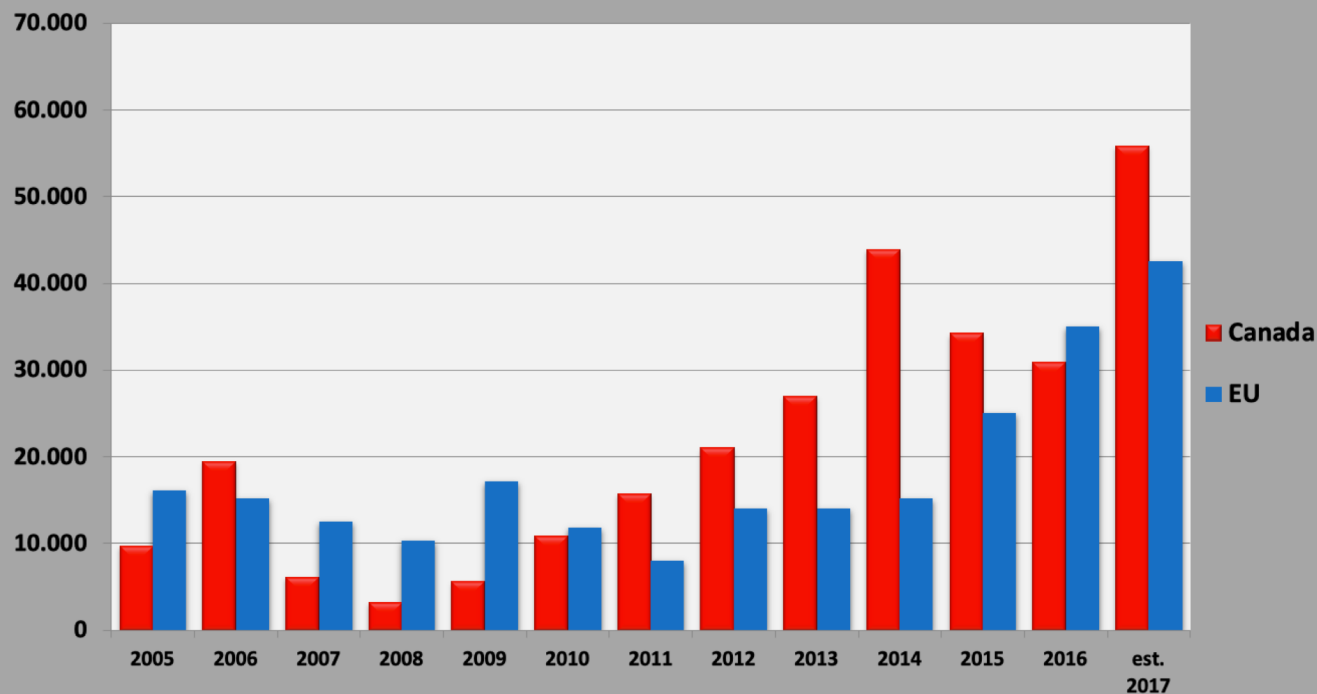
2017: ca. 46,700 ha





COLLECTION OF MARKET DATA

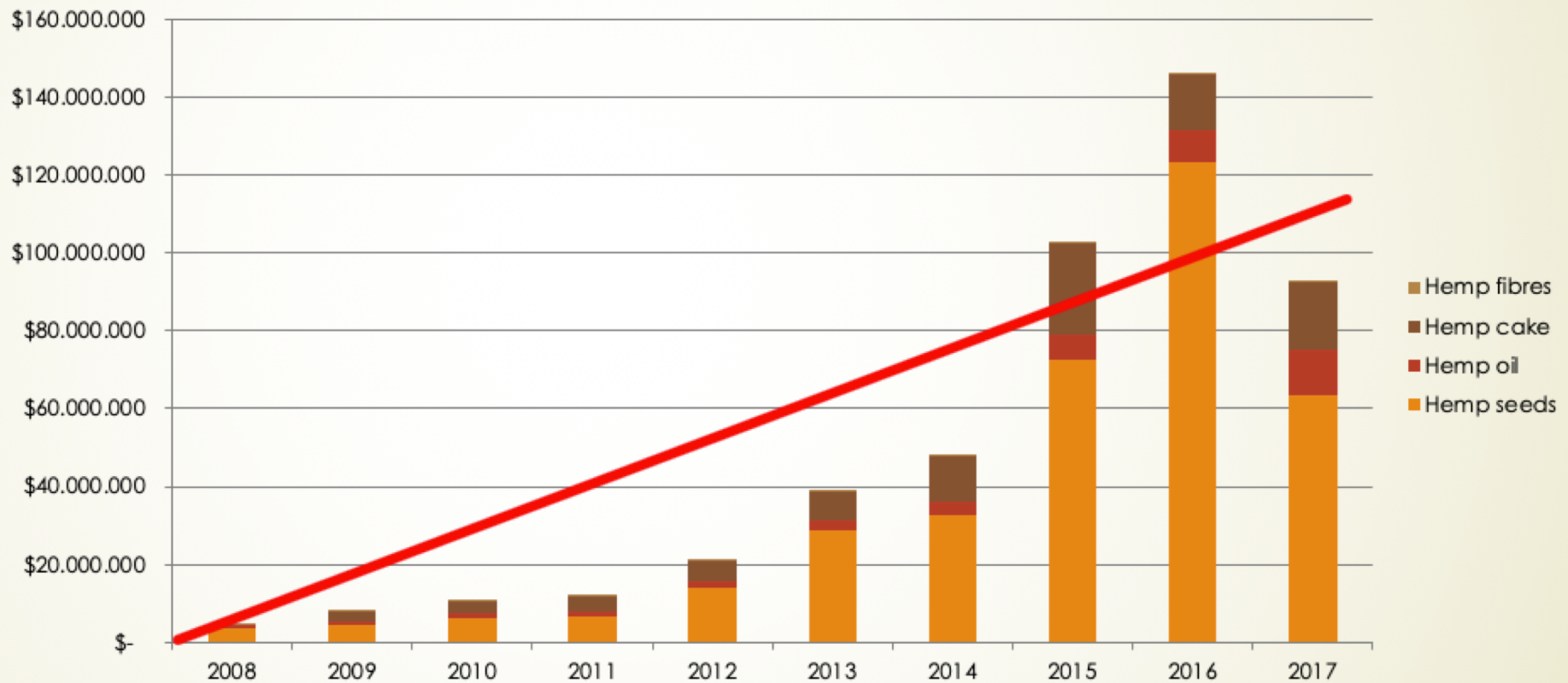
Hemp Cultivation Area in the EU and Canada (ha)



Source: EIHA (2018), CHTA (2018), Hempro Int. (2018)



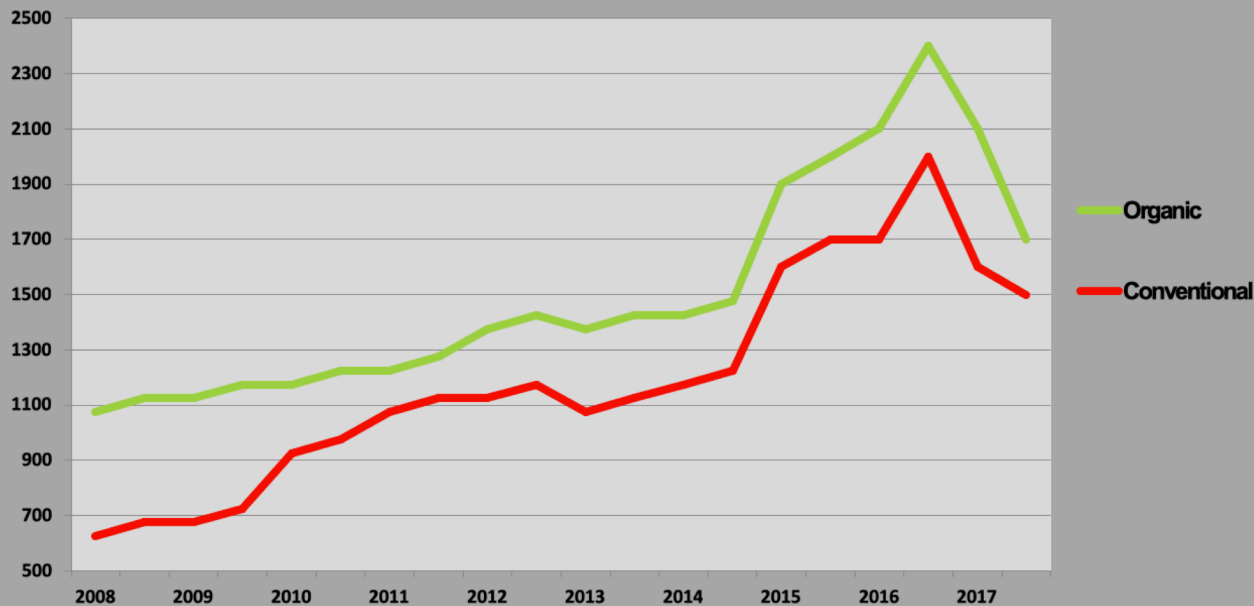
Canadian Exports of Hemp





COLLECTION OF MARKET DATA

Price development of hempseed (China imports):
Hempseed (food) prices (EUR/mt)
Based on full truck, FCA Rotterdam, cleaned 99,5% purity



Source: Hempro Int. (2017)



In Europe the demand for Hemp seed has been increasing over the years and was at about 18,000 metric tons in 2013. Estimates for 2015 see the market reach 21,000 metric tons (EIHA 2015). This is covered ca. 50% by domestic production and ca. 50% by imports from China. From all seed used for food production ca. 50% are organic certified and sold in the "bio-food" market (EIHA 2015).

mt hemp seeds p.a.	2008	2009	2010	2011	2012	2013	2014	est. 2015
EU production	6.000	7.000	6.000	5.500	7.000	9.000	9.000	11.500
- France	n/a	6.500	4.500	4.000	5.000	7.000	6.000	7.000
- others	n/a	500	1.500	1.500	2.000	2.000	3.000	4.500
EU imports*	10.000	9.700	10.800	11.500	10.000	9.000	9.500	10.000
EU exports**	500	900	800	500	300	100	100	200
EU consumption	15.500	15.800	16.000	16.500	16.700	17.900	18.400	21.300
- Food	600	700	1.800	2.500	2.700	3.200	6.400	8.300
- Feed	14.900	15.100	14.200	14.000	14.000	14.700	12.000	13.000

Development of European Hemp Seed Market 2008 – 2015

* Mainly from China, ** Exports of processed hemp seeds to North America

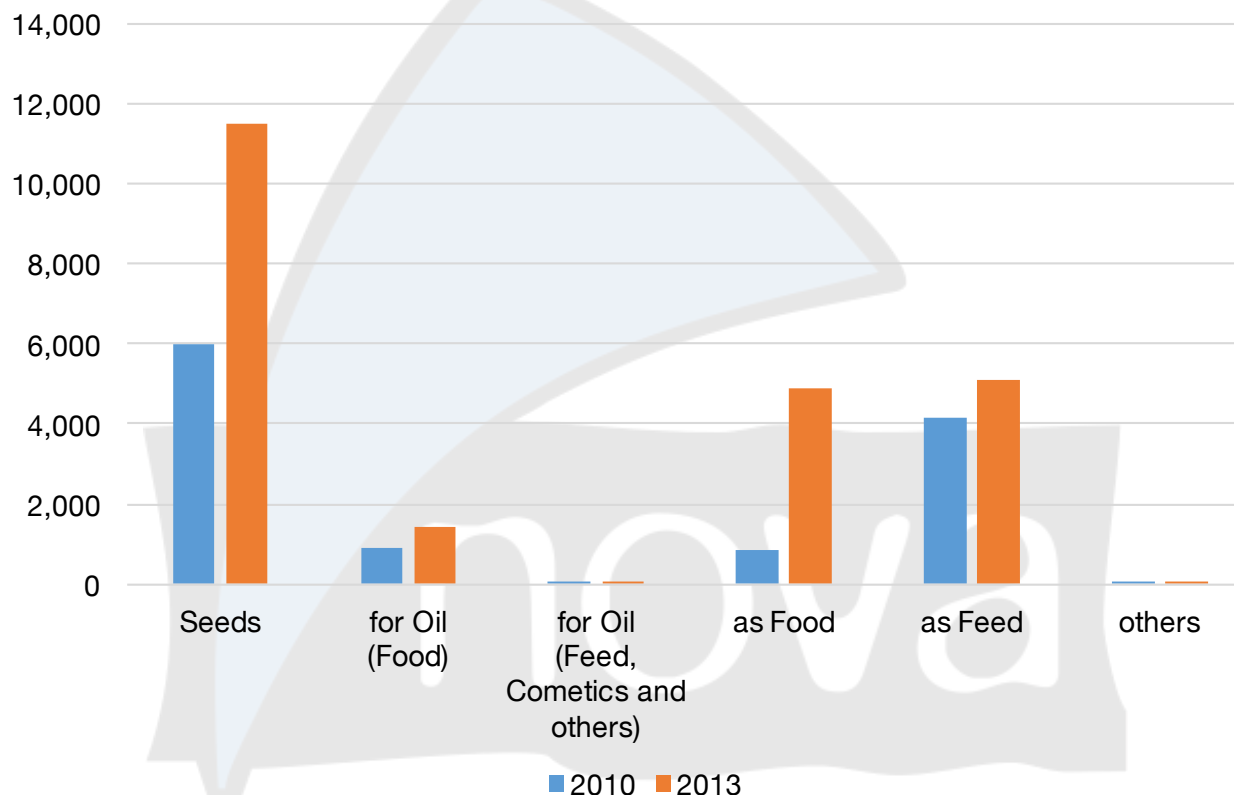
Sources: nova-Institut (2015) EIHA (2015), Eurostat (2015), Hempro Int. (2015)



Results of the 2015 EIHA survey: Hemp Seeds

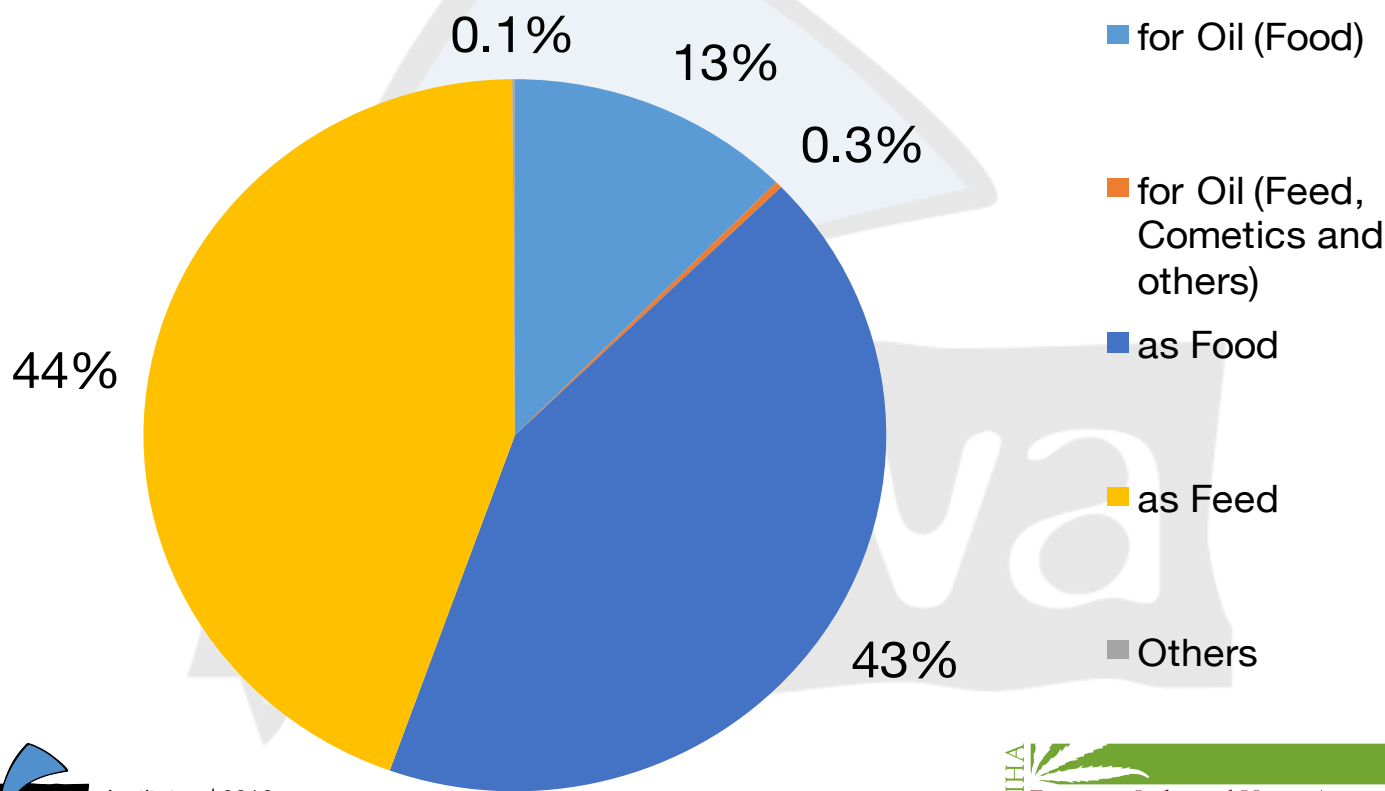


Hemp seeds (in tonnes)





Hemp seeds 2013, total: 11,500 tonnes





EU 2015: Production of 11,500 t, consumption of 21,300 t hemp seeds – main applications





Hemp muesli

Hemp bar

Hemp oil

Pictures: Hempro Int. (DE), HEMP SEED OIL EUROPE (UK)

Hemp Seeds and Hemp Oil as Food

Hemp Oil – excellent and unique fatty acid spectrum

Today's Hemp oil is typically a cold-pressed gourmet oil from mature well-dried seeds. Its most unique nutritional feature is the "almost perfect" balance of the omega-3 and -6 essential fatty acids plus the presence of two "higher" omega-3 and -6 fatty acids, stearidonic acid (SDA) and gamma linoleic acid (GLA). These offer known health benefits and are found in only a few other vegetable oils – yet nowhere as balanced and tasty as in Hemp oil.

A gross imbalance in the omega-3/6 ratio in the Western diet is now considered an important contributor to the high occurrence of inflammatory, cardiovascular, skin and even mental disorders. As a balanced source of these fatty acids, Hemp oil and seeds can help reduce their occurrence, in good taste.

Hemp Protein – high quality

Hemp seeds and seed cake flour contain a high quality protein. It is easily digestible, and contains all essential amino acids in a balanced ratio that satisfies the protein needs of adults. Commercially available protein flour and powders are high in protein and dietary fibre. They are used in shakes and smoothies, as well as for baking.

Minerals, Vitamins and other Micronutrients

Hemp seeds, nuts and flour also offer a bonanza of micronutrients that are often lacking in our diet. These Hemp seed materials are good or even excellent sources of magnesium, manganese, iron, zinc and potassium – and of several B1, B3 and B5 vitamins. Hemp seeds also contain significant amounts of phytosterols and of tocopherols, i.e. members of the Vitamin E complex. Overall, the nutritional richness and culinary versatility of Hemp seeds and their products make them an excellent basis for a healthy diet and a range of food products.

Typical Nutritional Composition of Shelled Hemp Seeds (per 100 gram)

Energy content:	580 kcal (2,430 kJ)
Fat:	45 g
Protein:	35 g
Total Carbohydrate:	8 g (Fibre: 6 g)
Ash:	6 g

Selected Minerals and Vitamins (in percent of daily value, DV):

Phosphorus:	130 %
Magnesium:	150 %
Manganese:	450 %
Iron:	90 %
Zinc:	60 %
Vit B1 (thiamine):	90 %
Vit B3 (niacine):	30 %
Vit B5 (panthotenic acid):	90 %
Vit E (tocopherol):	20 %

Fatty acid composition of Hemp Oil (Varies with hemp variety)

Unsaturated fatty acids:	~ 90 %
Oleic acid (18:1 omega-9):	10 – 15 %
Linoleic acid (18:2 omega-6, essential):	55 – 60 %
Alpha-linolenic acid (18:3 omega-3, essential):	17 – 20 %
Gamma-linolenic acid (18:3 omega-6):	2 – 4 %
Stearidonic acid (18:4 omega-3):	0.5 – 2 %
Saturated fatty acids	~ 10 %



Typical Nutritional Composition of Shelled Hemp Seeds (per 100 gram)

Energy content: 580 kcal (2,430 kJ)

Fat: 45 g

Protein: 35 g

Total Carbohydrate: 8 g (Fibre: 6 g)

Ash: 6 g

Selected Minerals and Vitamins (in percent of daily value, DV):

Phosphorus: 130 %

Magnesium: 150 %

Manganese: 450 %

Iron: 90 %

Zinc: 60 %

Vit B1 (thiamine): 90 %

Vit B3 (niacine): 30 %

Vit B5 (panthotenic acid): 90 %

Vit E (tocopherol): 20 %

Fatty acid composition of Hemp Oil (Varies with hemp variety)

Unsaturated fatty acids: ~ 90 %

Oleic acid (18:1 omega-9): 10 – 15 %

Linoleic acid (18:2 omega-6, essential): 55 – 60 %

Alpha-linolenic acid (18:3 omega-3, essential): 17 – 20 %

Gamma-linolenic acid (18:3 omega-6): 2 – 4 %

Stearidonic acid (18:4 omega-3): 0.5 – 2 %

Saturated fatty acids ~ 10 %



Hemp seeds – food applications



Hemp oil



Hemp nuts



Snacks

<p>BIO 4.79</p> <p>Raw Super Food Hen-nep olle 250 ml</p> <p>+</p>	<p>BIO 5.49</p> <p>Raw Super Food Hen-nep proteïne 100 g</p> <p>+</p>	<p>BIO 3.69</p> <p>Raw superfood Mini snacker hennep 100 g</p> <p>+</p>	<p>BIO 4.99</p> <p>Raw Super Food Muesli hennep 750 g</p> <p>+</p>
<p>BIO 2.99</p> <p>Zonnatura Granenreep gerst hennep 3-pack 3 stuks</p>	<p>BIO 2.69</p> <p>AH Hennepzaad 150 g</p>	<p>BIO 4.92</p> <p>Raw Super Food Hennepzaad raw biologisch 250 g</p>	



Big supermarkets and discounter selling hemp food products (2015):
Albert Heijn (The Netherlands), on top and
ALDI (Germany), right.

Knusperone **Schwarze Johannisbeere**
5 FRÜCHTERIEGEL

Jeder unserer leckeren Snacks besteht aus feinsten Früchten und Getreide.

Die Riegel bestehen aus Früchten und Ballaststoffen für ein erlesenes Geschmackserlebnis.

Mindestens haltbar bis: siehe Seitenlasche
Bitte kühl und trocken lagern.

150g e

Früchteriegel Schwarze Johannisbeere
Mit 56 % Fruchtbestandteilen
4 % Hanfsaat

ZUTATEN: Rosinen, getrocknete Apfelstücke, Oligofruktose, Vollkorn-Haferflocken (10 %), Fruchtzubereitung mit schwarzen Johannisbeeren (7 %) (schwarzer Johannisbeersaft aus schwarzem Johannisbeersaftkonzentrat (28 %), Birnensaftkonzentrat, Apfelsaftkonzentrat, Apfelmarmeladenkonzentrat, schwarzes Johannisbeerpüree (14 %), natürliches Aroma), Weizengluten, Cornflakes (Mais, Gerstenmalzextrakt), schwarzes Johannisbeersaftkonzentrat (5 %), Hanfsaat (4 %), Citrusfaser, Magermilchjoghurt-pulver, färbendes Lebensmittel Rote-Bete-Pulver (Maltodextrin, Rote-Bete-Saftkonzentrat), Palmöl, natürliches Aroma.

Kann Spuren von Erdnüssen, Schalenfrüchten und Sesamsamen enthalten.

Durchschnittliche Nährwerte			
	Je 100 g	1 Riegel (30 g)**	%
Brennwert	1312 kJ 312 kcal	394 kJ 94 kcal	5 %
Fett	3,3 g	1,0 g	1 %
- davon gesättigte Fettsäuren	1,2 g	0,4 g	2 %
Kohlenhydrate	52 g	16 g	6 %
- davon Zucker	42 g	13 g	14 %
Ballaststoffe	17 g	5,1 g	6 %
Eiweiß	10 g	3,0 g	6 %
Salz	0,05 g	0,02 g	<1 %

* Referenzmenge für einen durchschnittlichen Erwachsenen (8.400 kJ / 2.000 kcal).
** 1 Portion = 1 Riegel (30 g) Schwarze Johannisbeere.
Die Packung enthält 5 Portionen.

DE-VAU-GE Gesandkostwerk Deutschland GmbH
Lüner Rennbahn 18 • 21339 Lüneburg

22160



2018 in Germany – hemp food became mainstream



Lidl & Aldi





Hemp products of the year 2018

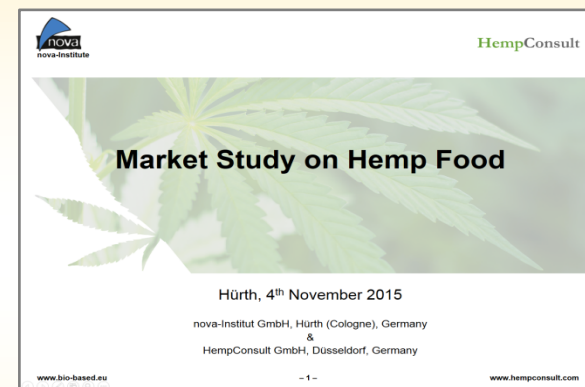




Market Study

nova-Institute (Germany) in cooperation with HempConsult (Germany) investigated the growing markets for **Hemp Food Products**.

www.bio-based.eu/markets/#hempstudies



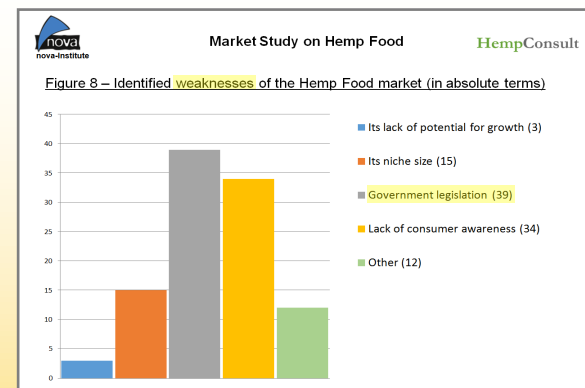
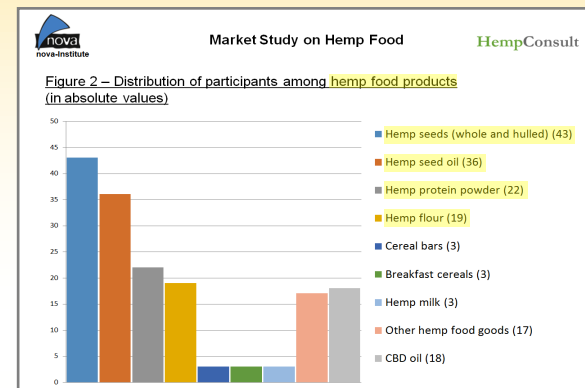


Market Study on Hemp Food



The "Market Study on Hemp Food" based on a survey of 171 producers and traders of hemp food from 21 countries mostly from Europe and North America it analyses and discusses the main market sections for hemp foods, the so called “super foods”, “nutritious foods” and “bio foods”. Additionally, it includes comparisons to the market for other nuts in the European Union and the US.

A double digit growth rate is expected with demand rising especially in food goods. A hemp seed market potential linked to a penetration of 5% of the European nut market would signify an added market value of € 1 billion/year. Two major problems are delaying the growth: government legislation and lack of consumer awareness. (April 2016)



16th

by nova-Institute

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 **Cologne, Germany, 20-21 March 2019**

12th International Conference on Bio-based Materials

 **Cologne, Germany, 15-16 May 2019**

16th International Conference of the European Industrial Hemp Association (EIHA)

 **Cologne, Germany, 5-6 June 2019**

