

# **Fact sheet about sensory properties of organic sunflower seed oil**

- **recommendations for processing**
- **recommendations for product development**
- **recommendations for marketing**

**Deliverable 6.3**

**FiBL Switzerland**



## Consumers' sensory preferences for organic sunflower oil



### France

Sunflower seed oil with an intense yellow colour and a medium to high intensity of sunflower seed-like taste are preferred by French organic consumers.

### Germany

German organic consumers prefer sunflower seed oil with a yellow colour, medium to high intensity of sunflower seed-like, nutty, hay/grain-like taste and odour, an intense yellow colour and a slight intensity of astringent and pungent mouthfeel.

### Italy

Italian organic consumers prefer sunflower seed oil with a medium to high intensity of sunflower seed-like, nutty and hay/grain-like taste and odour.

### Netherlands

In contrast to the consumer preferences of the other countries, Dutch organic consumers prefer sunflower seed oil with a neutral taste and odour. They also prefer oil with a yellow colour.

### Switzerland

Swiss organic consumers prefer sunflower seed oil with a medium to high intensity of sunflower seed-like, nutty, toasted and hay/grain-like taste and odour. A medium intensity of astringent and pungent mouthfeel as well as a medium intense yellow colour is preferred.

# Sensory properties of organic sunflower oil

The main purpose of the ECROPOLIS project was to provide and exchange sensory information on organic food to the industry (organic associations, producers, processors, retailers, wholesalers) as well as to the public at large: the consumers. Not only sensory profiles comparing organic and conventional food products were developed. Besides, the impact of regulations for organic food production on sensory properties of organic food and the labelling effect on consumers' sensory preferences were investigated. The consequences of the results can now be used for improvements in product development and processing, as well as for sensory marketing of organically produced food.

## 1 Impact of EU organic regulation and private standards on sensory characteristics

### 1.1 Regulatory impact on sensory properties of organic sunflower seed oil tested

EU regulations and Swiss governmental regulations for organic food production do not include sensory relevant requirements for the processing of vegetable oil. Therefore, sensory differences between EU and Swiss organic and conventional oil cannot be explained by a regulatory impact.

Considering the production of vegetable oil for direct consumption, Bio Suisse, Demeter (international and national) and Bioland standards include additional restrictions that have an impact on consumers' acceptance. Bio Suisse restricts mechanical pressing at a maximum temperature of 50°C. Chemical extraction by means of solvent agents, deodorisation and all other methods of refining are prohibited. Bioland and Demeter restrict mechanical pressing of vegetable oils to a maximum temperature of 60°C. Deodorisation of oils for direct consumption, chemical extraction and all steps for refining are not permitted according to Bioland standards. Demeter allows deodorisation below 160°C, but only as an exception and with prior permission by Demeter, whereas chemical extraction and refining are also not allowed.

It could be shown within the ECROPOLIS project that there is a correlation between deodorisation, refining and the intensity of pleasant taste, odour, appearance and mouthfeel characteristics of the tested Bio Suisse, Demeter and Bioland sunflower seed oils. These characteristics were preferred by consumers, as shown within ECROPOLIS. It can be concluded that the additional requirements for plant-based oils from Bio Suisse, Bioland and Demeter lead to sensory properties preferred by organic consumers.

### 1.2 Summarising impact matrix about regulatory impact on sensory properties of organic sunflower seed oil

The regulatory impact through EU regulations and Swiss governmental regulations for organic food production (EU/CH), as well as through private organic standards (Bio Suisse, Demeter (national and international) and Bioland) on sensory properties of natural yoghurt is shown in the following table.

**Table 1: Impact on sensory properties of sunflower seed oil through regulatory requirements**

Relevant standard issues for sensory properties	Relevant restriction or general allowance	EU Regulation 889/2008	Private organic standards	Impact on sensory properties				Regulatory impact			
				Taste	Odour	Texture	Appearance	EU/CH	Bio Suisse	Demeter	Bioland
<b>Ingredient of agricultural origin</b>	Oil	A	A	X	X	(X)	X	-	-	-	-
<b>Processing methods</b>	Extraction method	A	Bio Suisse: chemical extraction not allowed, only mechanical extraction up to 50°C Bioland, Demeter: chemical extraction not allowed, only mechanical extraction up to 60°C	X	X	X	X	-	X	X	X
	Purification method	A	Bio Suisse, Bioland: deodorisation, refining not allowed Demeter: refining not allowed, deodorisation only with prior permission	XX	XX	XX	XX	-	XX	XX	XX

A: allowed; -: no impact; (x): probable impact; X: relevant impact; XX: high impact

## 2 Factors that influence the sensory characteristics of sunflower seed oil

Sensory properties of vegetable oils are influenced by the quality of raw material and by the processing methods.

### 2.1 Taste

#### *Raw material*

The intensity of the taste related sensory characteristics of sunflower seed oil depends on whether the seeds are pressed with or without their hulls and to what extent the oil is further processed. Sunflower seed oil made from whole seeds has a stronger taste and is more astringent and bitterer than oil from shelled seeds. Negative sensory attributes are, for example, a burnt or rancid taste. Both are indicators of mistakes during storage of raw material and oil as well as during processing.

#### *Processing methods*

Virgin oil with a low processing degree (cold pressed, no refining) made from high-quality raw material has an intense sunflower seed-like, nutty taste, whereas refined oils often have a relatively neutral taste.

## 2.2 Texture

### *Raw material*

Sunflower seed oil made from whole seeds has a more astringent mouthfeel than oil from shelled seeds.

### *Processing methods*

Non-refining leads to a more intense pungent and astringent mouthfeel.

## 2.3 Appearance

Non-refined sunflower seed oil has an intense yellow colour, whereas refined oil is relatively pale. Hence, the applied extraction and purification methods have the most decisive impact on pigments in oil.

## 2.4 Odour

### *Raw material*

As with taste, the odour depends on whether the seeds are pressed with or without their hulls. Sunflower seed oils made from whole seeds have a stronger odour. Negative characteristics are a burnt or rancid odour. Both are indicators for mistakes during storage of the raw material and oil as well as mistakes during processing.

### *Processing methods*

To what extent sunflower seed oil is further processed influences the intensity of odour characteristics. Non-refined oils have an intense sunflower seed-like and nutty odour, whereas refined oils often have a relatively neutral odour.

## 3 Country-specific attributes of liking and recommendations to improve consumers' acceptance of sunflower seed oil

The country-specific attributes of liking and disliking are illustrated in the following.

### **France**

Organic consumers in France overall prefer sunflower seed oil with persistent aftertaste flavour and a sunflower seed-like, nutty and roasted odour. Similarly, a hay-grain odour is preferred. Furthermore, sunflower seed oil is preferred by French organic consumers if it has a sour, roasted and nutty seed taste and if the oil tastes like hay-grains. In addition, sunflower seed oil should have an astringent texture/mouthfeel and intense yellow colour. Accordingly, virgin oils, which provide these sensory characteristics, are particularly liked by French consumers.

## **Germany**

German organic consumers predominantly favour sunflower seed oil with a hay-grain taste. Also a nutty and strong sunflower seed taste is preferred. They prefer a persistent aftertaste flavour. A pungent, astringent, adhesive and velvety texture/mouthfeel is also relevant to achieve a high acceptance. The odour should be sour. In contrast, organic consumers in Germany dislike a rancid fried oil odour, which should, therefore, be avoided. Particularly the organic non-deodorised or non-refined oils tested within the ECROPOLIS project fulfil the most appreciated sensory criteria and are, therefore, preferred by German organic consumers.

## **Italy**

Organic consumers in Italy predominantly prefer sunflower seed oil with an astringent and pungent texture/mouthfeel. Sunflower seed oil should also have a persistent aftertaste flavour and an intense yellow appearance. Regarding odour, consumers prefer a hay-grain, sunflower seed-like and toasted nutty odour. They prefer sunflower seed oils with hay-grain taste, toasted, nutty and roasted taste. In contrast, a sour taste should be avoided as it is significantly disliked by Italian organic consumers.

One conventional and two EU organic products tested, which were purified by filtering, were more preferred by Italian consumers than the tested deodorised products.

## **Netherlands**

Organic consumers in the Netherlands prefer sunflower seed oil that is characterised by a used oil taste. Attributes of disliking are unknown. The sunflower seed oils tested within the ECROPOLIS project differed in their sensory properties; however, consumers' acceptance of the products did not differ significantly.

## **Switzerland**

Organic consumers in Switzerland favour sunflower seed oil with a sour odour and yellow colour. The oil should, furthermore, have an astringent texture/mouthfeel to achieve a high acceptability among Swiss organic consumers. The non-deodorised oils were, therefore, most liked by consumers in the sensory analysis of the ECROPOLIS project. However, neither the organic nor the conventional sunflower seed oils in the test completely fulfilled the expectations of consumers. This shows that there is need for product improvement.

## 4 Label effect

An effect of the organic label on consumers' liking (label effect) was found regarding sunflower seed oil in France, Germany, the Netherlands and in Switzerland, while in Italy, no significant impact of the organic label on the overall liking of sunflower seed oil was found.

A strong positive label effect indicates a largely positive image of the product characteristic 'organic'. In such cases, it is promising to highlight the attribute 'organic' as a unique selling proposition when marketing the product. In cases of no or negative label effects, product improvement is required.

### France

In France, the organic label has an influence on the liking of sunflower seed oil. The tested organic sunflower seed oil samples received higher scores in the branded (with labelling) compared to the blind test (without labelling) regarding overall liking. In contrast, label effect was found when labelled as conventional: one of the conventional oils scored higher in the branded test and the other one scored lower. In the branded test, French heavy users scored higher for organic oils and lower for conventional or organic oils labelled as conventional compared to the results of light users. A different picture occurred when the organic label was not shown: heavy users scored lower both for organic and for conventional oil samples in the blind test than in the branded test. The label effect towards organic sunflower seed oil suggests that highlighting 'organic' as a unique selling proposition is a promising marketing strategy for organic sunflower seed oil in France.

### Germany

A positive label effect for organic sunflower seed oil was found in Germany in the sensory tests within the project ECROPLIS. In addition, conventional samples got significantly higher scores when labelled with an organic label. Germany was one of the countries where the labelling of sunflower seed oil had the highest impact on consumers' preference for sunflower seed oil. A difference between German heavy and light users was not found. The strong label effect among German organic consumers indicates the positive image of organic sunflower seed oil. Highlighting 'organic' as a unique selling proposition of sunflower seed oil represents a promising marketing strategy in Germany.

Due to the restrictions of Bioland and Demeter, significant differences in the intensity of taste, colour, odour and mouthfeel between sunflower oil produced under these two private standards compared to conventional and EU organic oil exist. These differences could be used by the private associations and the corresponding producers to promote organic oil products following a differentiation strategy.

## Italy

In Italy, the impact of organic labelling was low for both consumer groups (heavy and light users of organic food). In the branded test, heavy users of organic food scored higher for both the organic and the conventional oil samples compared to light users. In this country, the high sensory quality of sunflower seed oil is more relevant than the way of production. Against this background, a promising marketing strategy is to provide sensory information to consumers rather than pointing out 'organic' as a unique selling proposition. Furthermore, sensory marketing is promising since Italian organic consumers appreciate sensory information on products.

## Netherlands

Dutch organic consumers scored significantly higher for two of the organic samples tested in ECROPOLIS in overall liking when the organic label was shown. Regarding the other samples tested, one organic sample was rated slightly higher when the organic label was shown, while another sample scored slightly lower. Nevertheless, there is a potentially positive organic label effect on the overall liking of sunflower seed oil. Regarding differences between heavy and light users of organic food, heavy users scored lower for all tested products in the blind test and higher in the branded test, even for the conventional samples as well as the organic samples labelled as conventional. Given that the organic sunflower seed oil samples tested in the Netherlands were produced according to the EU regulation, while no oil produced according to private standards was tested, the organic and conventional oil samples did not differ significantly. To successfully market organic sunflower seed oil in this country, a promising strategy is to highlight the attribute 'organic' as a unique selling proposition, given that Dutch organic consumers have a positive sensory image of organic sunflower seed oil.

## Switzerland

In Switzerland, a positive organic label effect for sunflower seed oil was found. One organic sample was rated significantly higher in the branded test. For the other samples, there was a tendency that organic scored higher and conventional lower. No difference in the rating between heavy and light users of organic food was found in the blind test, whereas organic sunflower seed oils were scored higher and conventional oils lower by heavy users in the branded test.

Swiss consumers mentioned that they would be interested in sensory information addressing the processing techniques used or not used. As shown through the analysis of the sensory results, organic sunflower seed oils that are produced according to the Bio Suisse standards had a more intense taste, odour and colour. Therefore, this aspect represents a promising aspect for sensory marketing. By explaining the specific processing methods used for the production of Bio Suisse sunflower seed oil, the positive effects on sensory qualities and nutritional value through the regulatory restrictions can be pointed out.

## 5 Strategic options regarding product development and communication measures for organic sunflower seed oil

Table 2 shows that different measures for product development and communication need to be taken, depending on which strategy a company is choosing. Country-specific issues as well as product related issues have to be kept in mind.

**Table 2: Strategic options with regard to product development and communication**

OILS Strategic options	Imitation / standardisation strategy	Differentiation strategy (freshness, authenticity)	Country specific issues
<b>Product development</b>	<ul style="list-style-type: none"> <li>Standardised taste intensity, odour and colour comparable with conventional benchmark products.</li> <li>Ensure appropriate taste and odour intensity: generally medium to high, except in NL (low).</li> <li>Ensure intense yellow colour (in all countries important).</li> <li>Ensure rather slightly astringent and pungent texture (less important in FR and NL).</li> </ul>	<ul style="list-style-type: none"> <li>Differentiation possibilities: enlarge the range of different oil products.</li> <li>Differentiation in quality classes similar as olive oils (e.g. extra virgin oils in Italy).</li> <li>Use standards and processing methods, which maintain authenticity (cold pressing, exclusion of deodorisation, etc.).</li> </ul>	<ul style="list-style-type: none"> <li>Different country-specific expectations regarding taste and odour (see standardisation strategies)</li> <li>Also many non-organic oils are traditionally and carefully processed (benchmarks).</li> </ul>
<b>Communication measures</b>	<ul style="list-style-type: none"> <li>Communicate main sensory characteristics.</li> </ul>	<ul style="list-style-type: none"> <li>Communicate specific processing restrictions and their contribution to added sensory value.</li> <li>Introduce labelling system for different taste attributes.</li> <li>Make consumer tasting in shops.</li> <li>Offer training for sales staff.</li> </ul>	<ul style="list-style-type: none"> <li>Preference for organic sunflower oils: CH, DE, FR, IT and NL (except PL).</li> <li>Positive influence of organic labelling in DE and partly FR.</li> <li>Low or no influence of organic labelling in IT, NL (no data in PL, CH): attributes other than organic should be communicated.</li> </ul>

The following checklist helps to identify improvement potential regarding product development and sensory marketing of organic sunflower seed oil.

Check points	Yes	No	Don't know
<b>Raw material:</b>			
Are all ingredients organic? Refer to EU Reg. 834/2007			
Are non-organic ingredients listed in Annex VIII?			
Could non-organic ingredients be replaced by an organic ingredient?			
<b>Additives:</b>			
Are the additives listed in Annex VIII?			
If applicable: Are the additives listed in private organic standards?			
Could the additives be avoided?			
Could the additives be replaced by an ingredient?			
Could the additives of agricultural origin be replaced by an organic additive?			
<b>Processing aids:</b>			
Are the processing methods allowed by the regulations and private organic standards (e.g. extraction and purification methods)?			
Are all processing steps really needed (e.g. deodorisation)?			
<b>Packaging:</b>			
Is the packaging really needed for product protection (e.g. double packaging)?			
Is it possible to recycle the package?			
Is it possible to dispose it ecologically?			
<b>Labelling:</b>			
Are the minimal standards of the food law as well as of the organic regulations fulfilled?			
Could the declaration be extended for better consumer information (e.g. declaration of processing methods, origin of raw material, food miles)?			
<b>Sensory Marketing:</b>			
Could the restrictions on extraction methods (in case of private standards) and its consequences on sensory properties of sunflower seed oil be used in marketing in a positive way?			
Could the prohibition of deodorisation and refining (in case of private standards) and its consequences on sensory properties of sunflower seed oil be used in marketing in a positive way?			

## 6 Description of OSIS

OSIS offers information about sensory aspects of food and related issues. All relevant data gained from research in the ECROPOLIS project are made available to consumers, associations, producers and processors of the food sector. OSIS offers various levels of data access based on the needs of the target users and highlights the relevant specific information, e.g. in a “European-Sensory-Journey”, easy-reading fact sheets or detailed reports.

## Imprint

Stolz, H., Espig, F., Kretzschmar, U. (2011): Fact sheets on all the tested products in the appropriate language. Deliverable No. 6.3 of ECROPOLIS Project. Research Institute of Organic Agriculture (FiBL), Frick, Switzerland.

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## Corresponding publications within the ECROPOLIS project

Schmid, O. (2009): Analysis of regulatory framework affecting sensory properties of organic products. Comparative report on specific sensory related requirements in regulations and standards for organic production.

Stolz, H., Jahrl, I., Baumgart, L., Schneider, F. (2010): Sensory experiences and expectations of organic food. Results of focus group discussions.

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Espig, F., Schmid, O., Stolz, H. (2011): Report with edited sensory data and linkage to consumer needs and acceptance – Impact of regulations and standards.

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Schmid, O. (2011): Report on the recommendations for a research agenda and strategic options for sensory quality communication for different target groups.

For further information please visit the project homepage at <http://www.ecropolis.eu>.