

## Organic food: a brief overview - Organic Burnt Sugar and Aromatic Caramel and their application in the food industry

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### Organic: what does it mean?

When we speak about organic products, we refer, as defined by The European Court of Auditors, to a way of producing food and other products that take into consideration the natural life cycles. Production process is part of a larger supply chain which includes food processing, distribution and import.

Organic agriculture is a systems approach to production that is working towards environmentally, socially and economically sustainable production.

We can define organic food as the product of a farming system which avoids the use of man-made fertilisers, pesticides, growth regulators and livestock feed



**Figure 1 Organic fruits and vegetables**

additives. Moreover, irradiation and the use of genetically modified organisms (GMOs) are prohibited by organic legislation.

Differently from conventionally grown produces, organic are grown with the help of natural fertilizers (manure, compost), weeds are controlled naturally and pests are controlled using natural methods (birds, insects, traps) or naturally derived pesticides.

Regarding organic meat, dairy and eggs, livestock must have access to the outdoor and they are given all organic, hormone free and GMO free feed, while their disease are prevented with natural methods such as clean housing, rotational grazing and healthy diet.

## How organic farming operates

Organic farming operates in accordance with key principles such as: crop rotation for an efficient use of on-site resources; severe restrictions on the use of chemical pesticides, synthetic fertilisers, antibiotics; ban on genetically modified organisms (GMOs); good use of on-site resources, such as manure for fertiliser or feed produced



**Figure 2 Organic salad cultivation**

on the farm; use of disease-resistant plant and animal species adapted to the local environment and ban on the use of hormones; animal husbandry practices tailored to the various livestock species. All those principles are designed to promote environment protection, maintain the biodiversity and build consumer trust in

organic products.

## EU Regulatory notes for organic food

Organic farming and production have been regulated in EU since 1991 and since 2010 for organic aquaculture. Currently, the organic supply chain in the EU is covered by Regulation (EC) No 834/2007 on organic production and labelling of organic products. This Regulation should have been replaced from the 1<sup>st</sup> January 2021 by the new Regulation (EC) No 848/2018; however, new organic legislation is expected to enter into force on 1<sup>st</sup> January 2022, further to the Commission's proposal to postpone its implementation for one year.

Regulation (EC) No 834/2007 defines organic production as an overall system of farm management and food production that combines best environmental practices, a high level of biodiversity, the preservation of natural resources and the application of high animal welfare standards.

This Regulation also outlines the objectives and principles of organic agriculture in the EU, fixes general production rules and describes the EU's organic production standards, control system and labelling requirements.

Its objectives can be summarized as the establishment of a sustainable management system for agriculture and the production of products of high quality; those products aim at responding to consumers' demand for goods produced using processes that do not harm the environment, human and plant health or animal health and welfare.

***The four principles on which organic farming is based are Health, Ecology, Fairness, and Care. Organic agriculture should sustain and enhance the health of soil, plant, animal, human and planet and should be based on living ecological systems and cycles, work with them and sustain them. It should also build on relationships that ensure fairness regarding the common environment and life opportunities and, finally, it should be managed with the aim to protect the health of current and future generations and the environment.***

***Those principles were approved by the International Federation of Organic Agriculture Movements (IFOAM) in September, 2005.***

Corresponding to the objectives and principles of organic production, the production rules are designed to promote environment protection, maintain the biodiversity and build consumer trust in organic products. They are based on key principles as prohibition of the use of GMOs, forbidding the use of ionising radiation, limiting the use of artificial fertilisers, herbicides and pesticides and prohibiting the use of hormones and restrict the use of antibiotics only when necessary for animal health.

The new regulation (EC) No 848/2018 will maintain all those objectives, principles and production rules. Additionally, it is designed to ensure fair competition for farmers whilst preventing fraud and maintaining consumer trust.

In order to create more transparency for consumers, the Regulation contains rules on labelling of organic products. Accordingly, the use of terms referring to organic production is restricted to products that are produced in accordance with the rules

laid down in the organic farming legislation. In the case of processed food, at least 95% by weight of its ingredients of agricultural origin must be organic. Furthermore, the labelling rules prescribe that certain product indications are compulsory. This includes the code number of the involved control body, an indication of the place where the agricultural raw materials were farmed and the EU organic logo, introduced by the Commission Regulation (EU) No 271/2010 of 24 March 2010.



**Figure 3 EU organic logo**

Organic products are not subjected to specific quality requirements; consequently, there are no scientific tests able to determine whether a product is organic or not. The organic status is checked and guaranteed in EU through a certification system, implemented by the Member States. So, the EU control system certifies the production processes, not the products themselves. Legislation on organic farming requires that all activities carried out by operators in the value chain be subjected to a control system. This therefore includes, from the production to the preparation and distribution of organic products and the annual on-site controls of organic operators and their public surveillance. In other words, it includes the activities of the competent national authorities, as well as those of the accreditation and control bodies. All organic operators at various stages of the supply-chain must submit their activities to the control system. In the case of irregularities, the rules foresee that products cannot be marketed as organic.

### **Advantages (and Disadvantages) of Organic Foods**

Many benefits are often recognized to organic food consumption. First, better nutrition; some studies (Baranski et al, 2011; Crinnion, 2010) have shown small to moderate higher levels of vitamin C, minerals and antioxidants than conventional foods. Moreover, organically grown products also show lower detectable levels of pesticide residues. Furthermore, people with allergies to foods, chemicals, or preservatives may find their symptoms lessen or go away when they eat only organic foods.

In addition to that, no ionising radiation, GMOs and hormones are allowed, while antibiotics are allowed, while antibiotics are permitted only when absolutely necessary for animal health.

On the other hand, organic food is sometimes perceived to taste fresher because it is often produced on smaller farms near where it is sold and it does not contain preservatives to make it last longer.

Organic is also linked to animal welfare; organic farming ensures that animals are fed a natural diet and kept in free-range conditions.

Finally, organic products are friendlier to the environment because they contribute to reduce pollution, conserve water, reduce soil erosion, increase soil fertility, and use less energy.

But the most important disadvantage related to organic food is the fact that it is usually more expensive; in fact, organic farmers do not use chemicals or artificial methods to grow crops or livestock, and consequently production is much lower. This, and the extra manual labour, make costs of organic farming surely more elevated than conventional agriculture and husbandry.

Moreover, it is known that organic foods do not contain preservatives; consequently, they are usually characterized by a short shelf life and can go bad quickly.

### **Market trend**

In recent years, organic market has developed significantly, and the organic food and beverages market forecast estimated notable growth in the near future, due to rise in awareness regarding the advantages of organic food and beverages industry intake. According to Mordor Intelligence report (2020), in Europe there is an increasing demand for minimalistic food products, which results in the search of products labelled as 'organic' or 'free-from'. Moreover, the growth of the organic food and beverage market is directly linked to a more conscious consumer interest in identifying the ingredients present in the food and beverage products. European consumers are also developing a high interest about the long-term effects of the food products they are

consuming, in terms of nutrition content and their effects on the health, environmental sustainability and social responsibility.

On the other side, typical restraints in developing the market are above all the high price of organic products and, in second place, the low shelf life in organic food in comparison with conventional foods.

But, despite this, the global organic food and beverages market in EU grew from 6 billion euros in 2000 to 27 billion euros in 2015, to 40 billion euros in 2018 and it is expected to reach 60 billion euros by 2022 (FiBL, 2019). This growth is obviously accompanied by a big development of organic agricultural lands (compared with 1999, when data on organic agriculture worldwide were available for the first time, the organic agricultural land has almost five-fold).

Even because, with the advancement in the technology and the increase in soil adaptability to organic farming the prices of organic food and beverages is expected to decline in the near future.

### **Consumer attitudes trend towards organic food**

In recent years, many studies (Stolz et al. 2011; Bilal Basha et al. 2015; Cachero-Martinez 2020; Le Anh and Tam 2020) have been conducted to monitor the evolution and changes of consumers perception of organic food and their attitude towards this kind of products.

Those studies revealed that in the last few years, organic food status has changed from “food fad” to an important business in a food industry that is expanding rapidly, as consumers seek alternative food sources to the conventional products. Organic food has become synonymous with healthy eating and safety for the consumer and its market increase is directly related to the fact that the awareness on the harmful effects of chemicals present in food is increasing among the consumers. Environmental benefits of organic production have clearly contributed to building a positive consumer attitude towards organic as well.

Nevertheless, some confusion in the perception of what does organic means still remains among consumers.

In fact, organic products are often confused with home and locally produced food. This is an important aspect, indicating the potential for growth of the organic sector by providing such consumers with appropriate information. Most consumers (including conventional consumers) have a good opinion of organic food and consider that it is better for health and that it is generally characterized by better quality than conventional food.

In conclusion, at this moment, health seems to be the primary organic food purchasing motivator, while price continues to be the main limitation to the consumption of organic products.

### **Most popular organic food categories**

According to some reports (Organic Trade Association, 2019; Mordor Intelligence, 2020), the most popular and consumed organic products are fruits, vegetables and dairy products. While on the other hand, fresh and frozen meat represents one of the fastest growing area in the organic market.

As for packaged and prepared foods, although they are not at the same level as the previous ones, their demand is also increasing in the world market. The same is happening for beverages, baked goods, snack foods and condiments.

A particular mention must be deserved to pet food, for which the increased focus on the health and overall humanization of pets has led to an increase in the organic market, that according to Marketwatch forecast, will see a 9% annual growth by 2023.



**Figure 4 Bakery products**

### **Burnt sugar and aromatic caramel in organic processed foods**

Many of the food categories mentioned above often involve the use of some dyes to achieve the desired colour and make them more attractive. Among different colours, according to some estimates, caramel represents worldwide 75 to 85% by weight of dyes for food use, however the organic version of caramel colours is not available because their production process include the use of catalysts to promote the caramelization. In this case, the alternative to caramel colour is represented by burnt sugars, produced without chemicals and capable of conferring both brown colour and taste to the final product.

Burnt sugars and aromatic caramels are widely used in the food industry. They are produced through the caramelisation of sugars, a process that creates, through the heat treatment of raw materials as sucrose, glucose and iso-glucose, many different large, coloured molecules and small volatile compounds responsible for the typical colour, taste and aroma of aromatic caramels and burnt sugars. As reported in many studies, some of those compounds are also associated with nutritional benefits, like, for instance, fructose dianhydrides with their prebiotic effects (Peinado et al., 2013; Arribas et al., 2010) and melanoidins (molecules responsible for the colour of caramels) that act as antioxidants and antihypertensive (Echavarria et al., 2012; Wang et al., 2011). For all of this, the possibility to use an organic ingredient may represent a very interesting opportunity.

Instead, other foods categories like, for instance, dairy products, ice creams and snacks often require toppings or fillings in their recipe. In fact, aromatic caramels are one of the most widely used toppings and fillings in the food industry. Therefore, and given that they usually represent more than 5% of the total ingredients of the food, the use of its organic version is mandatory to maintain the organic state of the food in the final product. In that regard, Secna Group has recently developed the organic version of both burnt sugar and aromatic caramel.

### **Secna Group organic burnt sugar and aromatic caramel**

SECNA Group is a world leader in natural food color, with 60 years of experience. The Companies of the Group, Sicna Italy, Secna Spain and Erkon Turkey, are specialized in the production of natural colors from vegetal sources.

Products include Anthocyanin, Concentrated Must, Grape Juice and Caramel. The first Company Sicna, founded in 1961 in Italy, started producing caramel color and caramelized sugar. Among these, Sicna can offer one organic burnt sugar (BS/B) and one organic aromatic caramel (SG/B).



**Figure 5 Secna Group logo**

The organic version of burnt sugar and aromatic caramel allows their use in multi-ingredients foods without affecting the possibility to label them as “organic”. Moreover, both burnt sugar BS/B and aromatic caramel SG/B are suitable for vegetarians and vegans and are Halal and Kosher certified.

The organic status of both products is guaranteed by CCPB Srl, authorised by the Italian Ministry of Agricultural, Forestry and Food Policies to operate as inspection and certification body for organic products in compliance with the provisions of Regulation (EC) 834/07 and its subsequent amendments.

The organic certification is subjected to annual renewal as a consequence of an audit which includes the inspection of the production site, the evaluation of the conformity of products and production process to organic Regulation's requirements and the control of product traceability in the supply chain.

## Organic Burnt Sugar BS/B



**Figure 6 Burnt sugar**

Burnt sugars are dark-brown liquids or solids, obtained by the controlled heat treatment of food sugars, without the use of any chemicals to promote caramelization nor to adjust the final pH of the product.

In the case of Organic Burnt Sugar BS/B, it is in liquid form, produced using organic cane sugar as raw material.

Characterized by a yellow-red brown tone and a slight negative ionic charge, it may be used in many different food applications with a double purpose. In fact, burnt sugar corresponds to the definition of both food ingredient and food color, depending on the primary scope of its usage. When its use confers taste and aroma to the final product, it can be labelled as an ingredient, thus avoiding the E number; but it can also be used with the sole scope to give color to the foodstuffs and in this case, it has to be considered as a food colorant and declared as E150a (or, alternatively, Plain Caramel). ). Being that the difference among the two functions is not always so easy to be defined, the food producers who use burnt sugar in their final products may refer, for labelling purpose, to the EUTECA (European Technical Caramel Association) decision-tree, whose objective is to help to distinguish among the color E150a and the aromatic foodstuff by a simple yes/no decision cascade.

The use of burnt sugars in the food industry is very large, because they result suitable in many food and beverage applications. Regarding beverages, organic burnt sugar BS/B can be used in soft brown drinks like cola as a substitute for caramel color E150d. In this case, the lower color intensity of burnt sugar and its peculiar reddish-brown shade confer to the beverage a distinctive aspect, commonly perceived as more natural. Moreover, BS/B can be also added to many alcoholic beverages containing up to 40% alcohol like whiskey, brandy, vermouth, and other wine-based drinks with the purpose both to give color and to homogenize it among different batches and, additionally, to confer to the final product its characteristic taste.

Concerning processed foods, bakery and baked goods manufacturers often use burnt sugar in their recipes with the aim of improving taste and color in products like bars, breads, cookies, desserts (cakes, cheesecakes and pies), muffins, pizza, sweet goods (doughnuts, Danish, sweet rolls, cinnamon rolls and coffee cake), when a yellowish-brown tone and some taste are desired. But that is not all; burnt sugar BS/B also finds application in chocolate, coffee, toffee, chestnut, hazelnut and vanilla ice creams, where it enhances the brown color and contributes with its peculiar taste; moreover, it can be also used in ice cream cones production, where its yellow-light brown shade fits perfectly with the typical color of cones.

Regarding meat products, as previously said organic meat seems to be one of the fastest growing area in the organic market. In this case, organic burnt sugar is useful mainly to enhance color and appeal of meat and sausages, and to increase the smoked or grill effect to meat. It can be used both to color the exterior surface and to penetrate the product.

Finally, BS/B is suitable for different pet food applications (dry, wet, pet treats) to improve color tones, odor and taste and makes them more appetizing.

### **Organic Aromatic Caramel SG/B**



**Figure 7 Aromatic caramel**

Same as burnt sugars, aromatic caramels are obtained by the controlled heat treatment of sugars. Typically characterized by a low colour intensity, they are mainly used to contribute to the taste of the product to which they are added. Since flavour is the most important characteristic of aromatic caramels, the product derived from the caramelization process can be used “as is” as an ingredient, providing an intense aroma and flavour to the food. However, it can also be mixed with other ingredients such as glucose syrups, glucose-fructose syrups and burnt sugars to obtain products with specific organoleptic profiles and chemical-physical attributes.

Specifically, organic aromatic caramel SG/B is produced by heating, under controlled temperature, organic sugar cane and glucose syrup from organic wheat. Its distinctive intense bittersweet taste and a typical yellowish red brown tone make it a perfect topping or filling for different foods as dairy products, ice creams, pastries, and popcorn, where it gives an important contribution to the taste and the visual appeal of the final product. Furthermore, thanks to its high alcohol solubility, it can also be blended with aperitifs and liqueurs improving their taste and golden hue, while its stability in the presence of salt allows to make it a taste enhancer for different sauces and seasonings.



**Figure 8 Crème caramel**

## Conclusions

Organic production is a system that integrates cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity. It takes into consideration the natural life cycles and is related to a sustainable system respecting the environment and animal welfare.

Organic food is the product of a farming system which avoids the use of man-made fertilisers, pesticides, irradiation and of genetically modified organisms. It includes fresh produce, meats, and dairy products as well as processed foods.

However, production process is only the first part of a supply chain including food processing, distribution and import. The whole supply chain is disciplined by the EU regulation on organic production and labelling of organic products, which ensures that the food meets a strict set of detailed regulations, relating to production methods and labelling and that the same high quality standards are respected all over the EU.

Worldwide, the demand for organic products have expanded quickly in the past decade and market forecast estimated notable growth in the future, stimulated by consumer perceptions that organic products are safe, clean and ethical.

For the purpose, Secna Group can offer organic certified burnt sugar and aromatic caramel, which are widely used in many different food and beverages products with the aim of conferring brown colour and taste and, in the case of aromatic caramel, also for flavouring, filling or topping.

Considering that organic processed foods need that all the ingredients of the recipe or, at least, a minimum of 95% are organic, Secna Group specifically developed those products with the aim to give to food producers the opportunity to improve taste and visual appeal of multi-ingredients foods without affecting the possibility to label them as “organic”.

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