

Nanotechnology in the context of organic food processing

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Keywords: Nanotechnology, organic food.

Abstract

Nanotechnology, the science of the ultra small, is up-and-coming as the technological platform for the next wave of development and transformation of agri-food systems. It is quickly moving from the laboratory onto supermarket shelves and our kitchen tables (Scrinis and Lyons, 2007). Therefore we investigated in a literature review and a comparison of the findings with the EU regulation of organic farming to what degree nanotechnology can be applied in organic food production. The regulations do not restrict the use of nanotechnology in general. Because little is known about the impact on environment and human health, precaution should be taken when it comes to applying this technology in organic food production.

Introduction and aim

Nanotechnology commonly refers to any engineered materials, structures and systems that operate at a scale of 100 nanometres or less (one nanometre is one billionth of a metre). It is fundamental to have a set of techniques that permit the direct manipulation and reconstruction of the world at the level of atoms and molecules (Scrinis and Lyons, 2007). The novel properties of nanomaterials offer many new opportunities for the food industry and that is the reason why nanotechnology is increasingly being used by the food processing sector and many other nanofood products are under research (Miller and Senjen, 2008).

Organic market is growing in many countries in Europe and overseas. More and more processed food is offered every day. The range of organic products varies from simple to highly processed ones. Every time more convenience food is being offered, including that with a long shelf life. Nanotechnology could be used to favour this process. However, organic consumers have particular expectations on quality parameters of processed food and there is a threat of damaging the integrity of organic food and losing consumer confidence by not fulfilling their expectations. Certain consumers question if specific processing methods, especially when new processing technologies are used, are still in conformity with organic food processing standards (Beck et al., 2006).

The objective of this paper is to analyse to what extent nanotechnology can be applied in organic food processing and whether it fits to the vision of organic agriculture.

Methods

A literature review on nanotechnology especially in food science was carried out. Principles, applications and possible impacts on environment and human health were evaluated. The findings were compared with the EU regulation on organic farming (EU-834/2007 that will apply from January 1, 2009) and the IFOAM principles.

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Results and discussion

There is already a broad offer of nano-products in the food market: additives, processing aids and food packaging material.

Additionally, some modern food processing methods also produce nanoparticles. Yet, until now there are no nano-specific regulations or laws to ensure its safety and nano-products are not required to be labelled. The development and implementation of nanotechnology is taking place in the absence of health and safety considerations. Very little is known about its impact on environment and human health (Miller and Senjen, 2008).

The EU Regulation for organic food and farming (EC-834/2007) and the IFOAM Basic Standards do not address nanotechnology. At present, it is possible that organic processed food contains nanoparticles. All additives and processing aids listed in Annex VI and allowed by the EU Regulation might be in use in their nano form. Processing methods which produce nanoparticles could also be in use to process organic food. Packaging materials for organic products are not restricted by the EU, thus, nanopackaging is probably being used as well.

The new EU Regulation on organic farming prohibits the use of substances and processing methods that might be misleading the true nature of an organic product and establishes organic processed food to be produced by the use of processing methods which guarantee that the vital qualities of the product are maintained through all stages of the production chain. However, the terms "true nature" or "vital quality" have never been defined in a way that can be assessed with laboratory methods. Whether nanotechnology alters the "true nature" or the "vital quality" of a product or not cannot be determined with scientific methods, and is thus a matter of political debate.

There exists a high level of uncertainty on how nanotechnology affects the products, the people and the environment. The organic sector is strategically positioned as a safe, healthy and environmentally friendly food alternative. An exclusion of nanotechnology from the organic food chain would be in line with the philosophy and principles of organics and would serve as a precautionary act to protect organic consumers, processors and farmers (Scrinis & Lyons, 2007; Paull & Lyons, 2008).

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