

## THE USE OF NANOTECHNOLOGIES AND NANOMATERIALS IN ORGANIC AGRICULTURE

### Definition and Scope

Nanotechnology is the fast growing science of the ultra-small. It has been defined as the technology relating to materials, systems and processes which exist or operate at the nano scale. Nanomaterials have been defined as having one or more dimensions measuring 100 nm or less, although there is controversy about this somewhat arbitrary limit and several organizations have proposed 300 nm in the context of the food sector. Nanomaterials include nanoparticles, nanotubes and other nanostructures. Importantly, nanomaterials can also be defined as having novel, specific characteristics which are not seen in larger particles of the same materials. These characteristics may occur at sizes up to a few hundreds nanometers depending on the material. Natural nanoparticles that exist naturally in the environment are not of specific concern to the organic movement nor are they the subject of this position, which is limited to manufactured nanomaterials. Homeopathy is not considered as falling in the scope of this position.

IFOAM proposes the following definition of manufactured nanomaterials, which are the concern of this position:

*“Substances deliberately designed, engineered and produced by human activity to be in the nanoscale range (approximately 1-300 nm) because of very specific properties or compositions (e.g. shape, surface properties, or chemistry) that result only in that nanoscale. Incidental particles in the nanoscale range created during traditional food processing such as homogenization, milling, churning, and freezing and naturally occurring particles in the nanoscale range are not intended to be included in this definition”.*

This position does not set detailed standards for organic production, inspection or certification. This will be addressed through the IFOAM Norms (IFOAM Standard and IFOAM Standards Requirements). Nevertheless, this position provides general guidance for the development of appropriate standards and their uptake throughout the organic agriculture sector.

## Concerns Regarding the Use of Nanotechnologies

The growing technological and commercial interest in nanomaterials comes from their novel properties, such as chemical reactivity, bioactivity and bioavailability. Nanotechnology is a field of research and development and has various commercial applications in the food and agricultural sector, such as in:

- manufacture of agricultural inputs such as growth promoters, pesticides and fertilizers;
- nutritional supplements and food additives;
- equipment used for food processing, which enter into contact with food;
- food packaging; and
- surface treatments.

Nanotechnologies are also used in textile and cosmetic products. Hence, humans are already exposed to manufactured nanomaterials and they are already released into the environment, although given the current limits in national and international regulations and labeling requirements, it is difficult to predict exactly how wide distribution and subsequent exposure is.

Research indicates that they can have a high toxicity to aquatic life, bacteria and human cells and tissues in vitro. At the nano-scale, even normally benign substances may become hazardous. A particular concern is the ability of nanoparticles to be directly taken up by individual cells and cell nuclei (where they may cause DNA mutation and even cell death), especially through the respiratory system, and to pass the blood brain barrier. Bioaccumulation is another concern. As the properties of materials at the nanoscale are so variable and poorly understood, it is not possible to provide a generic assessment of their health and environmental risk. Research would need to be done on each different nanomaterial and products thereof to investigate its potential toxicity, before its use could be considered safe. At the moment, in most countries, nanomaterials are not subject to any specific regulation and therefore are not differentiated from the non-nano version of the same materials when it comes to safety testing, regulations and labeling.

In view of the above concerns, a number of international organizations and Organic Agriculture associations have taken strong public positions in favor of a ban or a moratorium on the commercial use of manufactured nanomaterials until they are shown to be safe. This includes for example Friends of the Earth, the Organic Consumers Association, the International Union of Food Workers, Greenpeace, the International Center for Technol-

ogy Assessment and a number of organic standard setters.

Consultations at various levels have already shown that producers, processors and consumers of organic products overwhelmingly oppose the incorporation of manufactured nanomaterials in organic production.

### **Guidance for Organic Operators and Organic Standard Owners**

Manufactured nanomaterials are intentionally transformed in new and novel ways that renders them unnatural or 'synthetic' by most common forms of understanding. As such, they should be considered as inputs excluded from the organic method, even if they are identical in name and chemical composition to natural and permitted substances and materials. At most, it could be considered that a natural substance manufactured to nanoscale could, where no other management technique or acceptable input is available, possibly in the future be considered an allowed material on the grounds of necessity, provided that it has been proven safe through peer reviewed science and compatible with the principles of Organic Agriculture.

IFOAM considers that the use of nanotechnology and nanomaterials in food and agriculture is not compatible with the Principle of Care, which calls on us to manage organic systems in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment and to reject unpredictable technologies.

Hence IFOAM recommends that organic standard setters prohibit the use of nanotechnologies on the generic level for the time being and adopt clear definitions and approaches to ensure that intentionally manufactured nanomaterials are not used in organic production and processing, including in products, in packaging and on food contact surfaces, and that contamination of organic products by such materials is avoided as much as possible. Standards must however be flexible enough to accommodate cases of incidental production of nanoparticles through common processes such as homogenization, grinding, heating or burning.

IFOAM calls all organic producers, handlers and certifiers to refuse the use of nanomaterials and to increase their vigilance, education and information about the presence of nanomaterials in purchased inputs as these are not necessarily labeled as such and may be named as commonly accepted materials. However, nanomaterial contamination that is beyond the control of the organic producers should not lead to decertification.

### **General Recommendations for Governments and Industry**

IFOAM calls for an immediate moratorium on the commercial release of food and agricultural products containing intentionally manufactured nanomaterials until adequate regulatory systems are in place to ensure that

these materials be separately tested and labeled.

Governments should establish comprehensive and precautionary legislation to manage the risks associated with nanotechnology, and should safeguard the right of producers to refuse to use it and the right of consumers to say no to nanofoods and nanomaterials in other products. Nanomaterials must be considered as new substances even if the properties of their larger scale counterparts are well known.

In the absence of a moratorium, all food, agricultural and other products which include manufactured nanomaterials must be clearly labeled to allow consumers and farmers to make an informed choice.

Those who seek to commercialize manufactured nanomaterials should be required to demonstrate the safety of the new technology before the technology is released. If health and safety risks become evident, the owners of the technology should be strictly liable for the damages caused, including but not limited to the losses related to contamination of organic food and fiber.

Measures should be taken to ensure that organic producers do not bear the cost of contamination by nanomaterials present in the environment or hidden in equipment and inputs. The burden of proof must be placed on the manufacturers and vendors of nanomaterials and these should be considered hazardous and legally treated as such by governments until they are proven safe.

## REFERENCES

- Biosuisse, 2009, *Position de Bio Suisse au sujet des nanotechnologies*. [www.bio-suisse.ch/fr/nanotechnologie.php](http://www.bio-suisse.ch/fr/nanotechnologie.php).
- European Environmental Bureau, 2009, *EEB Position Paper on Nanotechnologies*. [www.eeb.org/publication/2009/090228\\_EEB\\_nano\\_position\\_paper.pdf](http://www.eeb.org/publication/2009/090228_EEB_nano_position_paper.pdf)
- FiBL page on nanotechnologies: [www.fibl.org/en/switzerland/themen/nanotechnology.html](http://www.fibl.org/en/switzerland/themen/nanotechnology.html).
- Friends of the Earth, 2008, *Out of the Laboratory and On to Our Plates – Nanotechnology in Food and Agriculture*. [www.foe.org/pdf/nano\\_food.pdf](http://www.foe.org/pdf/nano_food.pdf).
- Greenpeace, 2007, *Nanotechnology – Policy and Position Paper*. [www.greenpeace.org/raw/content/denmark/press/rapporteur-og-dokumenter/nanotechnology-policy-positi.pdf](http://www.greenpeace.org/raw/content/denmark/press/rapporteur-og-dokumenter/nanotechnology-policy-positi.pdf) [www.orgprints.org/13569/1/13569.pdf](http://www.orgprints.org/13569/1/13569.pdf)
- NOSB, 2010, Agenda and documents to the October 2010 meeting, recommendation entitled *National Organic Standards Board Materials Committee - Guidance Document - Engineered Nanomaterials in Organic Production, Processing and Packaging*.
- Paull, John and Lyons, Kristen, 2008, *Nanotechnology: the Next Challenge for Organics*. *Journal of Organic Systems*, 3(1), 3-22. [www.orgprints.org/13569/1/13569.pdf](http://www.orgprints.org/13569/1/13569.pdf)

