Nanotechnology in food and agriculture

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What is nanotechnology?

- Manipulating materials and systems at the scale of atoms and molecules
- “Nanomaterials” measure a few hundred nanometres or less
- A nanometre is one billionth of one metre

For more information visit http://nano.foe.org.au
To get some sense of scale…

- The earth is about 100 million times bigger than a football
- A football is about 100 million times bigger than a carbon “bucky ball”
Or to put in another way…

- If a nanometre were 1m wide, a red blood cell would be 7km long!
What is new about nano?

- The properties of matter change at the nano scale, eg colour, chemical reactivity
- Eg in bulk form zinc is white and opaque, in nano form it is transparent
- New applications for old materials, but also new risks

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Who’s involved in nano?

- Kraft
- Nestle
- Unilever
- Pepsi Co.
- Cargill
- Mars
- BASF
- Syngenta
- DuPont
- Bayer
- Over 60 governments world-wide

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Nanoproducts in Australia

• Sunscreens & cosmetics
• Fabrics & clothes
• Paints & varnishes
• Fuel catalysts
• Household appliances
• Surface coatings
• Specialty building equipment

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Growing numbers of nano food products are on sale now

- We have found 104 foods, food additives, food contact materials, kitchen products and agricultural inputs that contain manufactured nanoparticles which are on sale internationally.

- Some analysts suggest there are 150-500 nanofoods now available world-wide.

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Products now on sale include:

- Dietary supplements
- Nutritional additives
- Colour additives
- Food processing aids
- Long-life packaging
- Antibacterial kitchenware
- Fertilisers and pesticides

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Future nano food and agriculture

• Interactive, personalised foods
• Edible nano wrappers
• Chemical release packaging
• Extensive nano surveillance
• Interactive agrochemicals
• Nano manipulation of seeds
• Synthetic biology

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Nano is likely to erode our relationship with real food

• Nanotechnology could enable junk food to be fat, sugar and carbohydrate reduced, and vitamin, protein and fibre-enhanced…
Nano could erode our farming knowledge

• Automated nano surveillance and management systems could reduce the need for farm workers
• Nano could commodify farming knowledge and embed it in proprietary technologies

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Nanotechnology could threaten food sovereignty

- Could further concentrate corporate control of food and agriculture

Vandana Shiva argues that nano will

“accelerate existing trends of patent monopolies over life – making a few corporations ‘life-lords’”

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Nanoparticles also pose new toxicity risks

- Nanomaterials are readily inhaled and ingested, and at least some will cross skin
- Nanomaterials gain access to tissues and cells that larger particles cannot
- Inhaled nanoparticles can cross the blood-brain barrier

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Early studies show some nanoparticles can be toxic

- Nano silver is toxic to rodent liver, brain and stem cells; may harm beneficial bacteria
- Nano zinc oxide is toxic to rat and human cells even at very low doses
- Nano silicon dioxide <70nm can cause onset of pathology similar to neurodegenerative disorders
- Nano titanium dioxide can damage DNA in human cells, harm alga and water fleas, especially with UV light exposure

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Nano & microparticles in food may already be causing us harm

- Nanoparticles can distort our immune system response
- Nanoparticles can act as “Trojan horses”, smuggling foreign substances into cells
- Possible link between consumption of processed foods and irritable bowel and Crohn’s disease

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The world’s oldest scientific institution has called for action

The UK Royal Society recommended in 2004:

- Full safety assessment of all products that contain nano prior to market release
- All nano ingredients to be labelled
- Environmental release of nanomaterials to be avoided as far as possible
- Factories and research laboratories to treat nanomaterials as if they were hazardous

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Yet in 2008, while more and more nano products are entering the food chain, governments world-wide have taken NO action to manage nano’s risks

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NGOs, food workers and food activists are calling for a moratorium

- International Union of Food, Farm and Hotel workers – represents 12 million people from 120 countries
- Nyéléni World Forum for Food Sovereignty
- Friends of the Earth (Australia, US, Europe)
- Greenpeace International
- Australian GeneEthics Network
- The ETC Group and others…

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Friends of the Earth Australia is calling for a halt to sales of nanofoods until we have:

- New safety testing for all nano ingredients
- Labelling of all nano-ingredients
- Public involvement in decision making

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What you can do

• Call for governments to keep unsafe, untested nano out of our foods. Visit our website and go to the “take action” section
• Ask food manufacturers to keep nano-ingredients out of foods they sell
• Raise nanotechnology issues in your networks or workplace
• Get involved with FoE’s nanotechnology work
• Support real food and farming!

For more information visit http://nano.foe.org.au
For more information about nanotechnology or to get involved

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