

## Invited Commentary

### Organic more healthy? Green shoots in a scientific semi-desert

There is a widespread belief that organically grown products are safer, greener (better for the environment), more tasty and above all healthier than conventionally grown products. In the public mind, conventional production is still associated with chemical herbicides, insecticides and fertilisers. The already existing consumer concern regarding the quality and safety of conventional food further increases, fuelled by every food scandal. This has led to an increased societal interest in organically grown products, although this interest does not as yet translate equally in actual market share. The public perception on the benefits of organic farming and its products is in sharp contrast to the scepticism and controversy in the scientific world. This is largely due to the lack of reliable scientific studies comparing organic versus conventional farming and their respective products. In general, epidemiological evidence is flawed by a host of confounding factors, animal studies are poorly designed and limited, and there are no human intervention studies as yet published<sup>(1)</sup>. The absence of scientific data contributes to discussions which sometimes seem to be rather ideological than scientific in nature. Based on the scant literature published thus far, earlier reviewers came to the following conclusions and not much has changed since then. Concerning the environmental superiority, some report organic agriculture to be more environmentally sound and more sustainable<sup>(2)</sup>, which is contested by others<sup>(3,4)</sup>. A similar situation exists concerning product safety, scientists acknowledge that the risk of chemical pollution is reduced in organic products<sup>(4,5)</sup>, but some are concerned that this may be a trade-off with natural toxins<sup>(3)</sup>. There seems to be more consensus on the nutritional (compositional) quality, and although some believe that year to year variation is more important than the farming system<sup>(6)</sup>, it is maintained that conventional products usually contain higher levels of nitrate and lower levels of vitamin C<sup>(1,4)</sup>. Even if the latter is true, it is still unclear whether the compositional differences mean that organic food is more beneficial to your health than the conventional variant. As the authors in two articles in the current issue of the *British Journal of Nutrition*<sup>(7,8)</sup> state ‘Consumers expect organic products to be healthier, however, limited research has been performed to study the effect of organic food on health’.

The absence of proof has led some scientists to believe that organic health claims belong to the realm of quackery. This feeling is probably reinforced by its ideological background and surely by the anti-scientific attitude and preference for ‘unconventional methods’ of some supporters. These two papers are clearly totally uncontaminated by that, although it is clear from the original report (see reference 12 in Ref.<sup>(8)</sup>) that the larger project of which the present study was a part involved also similar ‘methods’. Anyway, does organic

equal quackery? The absence of proof is a problem for now, but one may also conclude that the problems in this field are just the same problems inherent to all research on health claims attached to food. Irrespective of the theoretical (or for that matter ideological) background of such claims, the main question is always how to scientifically show and prove the health promoting function of a certain food. Foods with health claims are commonly referred to as functional foods. Applying the same scientific standard to the field of functional food has led at least one renowned scientist in the field to conclude that some functional foods are no more than quackery before regulation was introduced<sup>(9)</sup>. Since July 2007, in the European Union, health claims on food (or components) have to be built on at least some scientific evidence, which is then reviewed by the European Food Safety Authority before a claim is allowed (see EC legislation<sup>(10)</sup>). Organic products are defined differently under another EC regulation concerned only with the production methods<sup>(11)</sup> and not with health or health claims. In the mean time, it is clear that trying to prove that organic is more healthy faces similar, if not exactly the same, challenges as are faced in functional food research. Researchers in the latter field have to prove that one has achieved ‘an improved state of health and well-being and/or reduction of disease’, a difficult task especially in essentially healthy people. Furthermore, it is hardly possible to define ‘an improved state of health and well-being’ in the current absence of objective standards or parameters for better health. What is needed are reliable physiological markers or biomarkers, and they would be most applicable to the ‘reduction of disease’ part of functional food, since disease can in principle be measured. Actual protection against disease can be studied in animal experiments, but it remains hard to translate those results to human subjects. In human subjects, in particular, the following problems are encountered. Useful markers should be causally related to disease and therefore reliable predictors of (a reduced risk of) it. Unfortunately, no such markers are yet available. What is available are markers of biological response, but it is still unknown what the response means in terms of health and the reduction of disease. For example, certain products claimed to increase intestinal health and resistance indeed change certain immunological parameters in the intestine<sup>(12)</sup>. These parameters are obviously somehow involved in immunology, and hence defence, but it is still unclear whether they translate into either improvement or deterioration of health, or whether they make no difference at all. In an even more striking example, dietary plant sterols and stanols reduce ‘bad’ LDL blood lipoprotein levels, but positive effects on cardiovascular health have never been proven, and consequently claims to that effect have been rejected

by the European Food Safety Authority (see European Food Safety Authority website for latest opinion).

It can be concluded that proving food health claims is very difficult. But that does not say that it is impossible. Research should continue using sound scientific methods. That is exactly what the study described in the two papers does. This is the first large comprehensive well-designed study into the possible health effects of organic food using scientific methods. The authors should be commended for that and for thus preparing the ground for further scientific research in this area.

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## References

- Williams CM (2002) Nutritional quality of organic food: shades of grey or shades of green? *Proc Nutr Soc* **61**, 19–24.
- Köpke U (2005) Organic foods: do they have a role? *Forum Nutr* **57**, 62–72.
- Trewavas A (2001) Urban myths of organic farming. *Nature* **410**, 409–410.
- Magkos F, Arvaniti F & Zampelas A (2006) Organic food: buying more safety or just peace of mind? A critical review of the literature. *Crit Rev Food Sci Nutr* **46**, 23–56.
- Tasiopoulou S, Chiodini AM, Vellere F, *et al.* (2007) Results of the monitoring program of pesticide residues in organic food of plant origin in Lombardy (Italy). *J Environ Sci Health B* **42**, 835–841.
- Jørgensen H, Brandt K & Lauridsen C (2008) Year rather than farming system influences protein utilization and energy value of vegetables when measured in a rat model. *Nutr Res* **28**, 866–878.
- Huber M, van de Vijver LPL, Parmentier H, *et al.* (2010) Effects of organically and conventionally produced feed on biomarkers of health in a chicken model. *Br J Nutr* **103**, 663–676.
- de Greeff A, Huber M, van de Vijver LPL, *et al.* (2010) Effect of organically and conventionally produced diets on jejunal gene expression in chickens. *Br J Nutr* **103**, 696–702.
- Katan MB (2004) Health claims for functional food. *Br Med J* **328**, 180–181.
- EFSA website: European Food Safety Authority (EFSA): nutrition and health claims. [http://www.efsa.europa.eu/EFSA/KeyTopics/efsa\\_locale-1178620753812\\_NutritionAndHealthClaims.htm](http://www.efsa.europa.eu/EFSA/KeyTopics/efsa_locale-1178620753812_NutritionAndHealthClaims.htm)
- Council Regulation (EEC) No 2092/91 Organically grown agricultural products and foodstuffs. [http://europa.eu/legislation\\_summaries/agriculture/food/l21118\\_en.htm](http://europa.eu/legislation_summaries/agriculture/food/l21118_en.htm)
- Hoyles L & Vulevic J (2008) Diet, immunity and functional foods. *Adv Exp Med Biol* **635**, 79–92.