



Organic Food Quality & Health

Organic Food Quality & Health Newsletter March 2009
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Dear Reader,

With pleasure we present to you the first FQH newsletter of 2009.

The focus of the FQH Newsletter is to make information on topics, relevant to FQH, visible and easy to find.

We wish you pleasure and inspiration reading this Newsletter.

More information on Organic Food Quality and Health you can find on the FQH-website www.organicfqhresearch.org. We heartily thank the members who provide us with information. Contributions to a next Newsletter or to the Agenda can be sent to the FQH-coordinator: fqh@louisbolk.nl.

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1 FQH News

1.1 FQH joined TP Organics!

In 2008 FQH joined the Technology Platform for Organic Food, and Farming (Food, Fairness and Ecology) of IFOAM.

IFOAM's EU group and ISO FAR have jointly commenced a process towards a Research Vision for 2025, focusing on innovative research into organic food and farming. FQH is now part of this process. The vision is intended to form the basis of a technology platform in the field, named 'TP Organics.' The technology platform highlights sustainable food systems and public goods.

Read more at: www.tporganics.eu.

The Research Vision can be downloaded at:

http://www.tporganics.eu/upload/TPOrganics_VisionResearchAgenda.pdf .

2 Articles and other relevant information

2.1 FQH Workshop at BioFach: “Latest Research Results on Organic Food Quality and Health”

On February 19th, FQH organized, together with ICROFS, an interesting Workshop at the BioFach Congress in Nuremberg. Organic food may offer an operational approach to improve human health. The direct reason is that a diet based on organic foods in some cases may be healthier than the same diet with conventional quality. The indirect reason is that consumers taking interest in organic food are also likely to modify their lifestyles in ways that stimulate their general health situation. In the Workshop, leading scientists summarized, presented and discussed recent results on health effects from organic food. The Workshop also discussed the expectations of consumers towards the health effects of organic products. Abstracts of the four presentations can be found below:

2.1.1 Overview of research linking organic production methods and health effects in the lab, in animals and in humans

Linking organic production methods to health effects in the lab, in animals and in humans

Machteld Huber, Lucy van de Vijver

Department of Health Care and Nutrition, Louis Bolk Institute, Netherlands

Abstract: The expectation that organic products are more healthy is a strong motivation for consumers to buy organics. However, if the question is posed: "Is organic really more healthy?", the answer is on the one hand negative, as this question cannot be answered positively. On the other hand the good news is, that the 'body of evidence', about a positive answer towards this question, is increasing. The 'body of evidence' is the amount of research results that point in the same direction, which is necessary in science before you can speak of 'scientific proof'. So this is increasing. What is the status in the beginning of 2009? There are two types of research results: 1. Results of analyses of nutritional value (content of nutrients) of products and 2. Results of health effects in living organisms.

About 1. it can be stated that more than a hundred studies have been published, comparing organic and conventional products. It is clear that there is a big variation among the types of studies, as well as among the results. On average there is a difference of 10-12% in protein content found in grain, less in organic. Healthy fatty acids like CLA's and omega-3 fatty acids occur 10-60% more in organic dairy. Vitamin C ranges between 5-90% more in organic. Secondary metabolites (e.g. flavonoids, polyphenols, glucosinolates, etc.) occur 10-50% more in organic. Dry matter is higher to a max. 20%. About the undesired elements it can be stated that there are less residues of pesticides and of antibiotics, much less antibiotic resistant bacteria. Mycotoxins are equally occurring among organic and conventional grains. Nitrate is lower in organic products.

About 2. Taken into account these facts, the question is what these research results mean in relation to health? There are lots of hypotheses about this, but they are often reconsidered. And there is the factor of 'bio-availability': does the body take up the nutrient that is consumed? And once taken up, what is the 'biological effect'? For many nutrients an optimum amount of intake is known. Too little as well as too much might be harmful. That is why other types of studies are needed, being effect studies, in vitro (in the lab), in animals and in humans. Some results of in vitro studies are a decrease of cell proliferation of cancer cells on an extracts of organic, compared to conventional strawberries (Olsson, 2006) and a better repair of damaged DNA in bacteria on juices of several organic vegetables, compared to conventional juices (Ren, 2001). Indications from some animal studies indicate that organic feed may lead in animals lead to an increased fertility (Staiger, 1988), increased immune parameters (Finamore, 2004, Lauridsen, 2007) and a lower bodyweight and fat tissue (Lauridsen, 2007). In a recent study in the Netherlands with two generations of three chicken lines, that received either organic or conventional feed, the intention was to identify biomarkers for intervention studies in humans. In this study the organically fed animals had a lower body weight, a higher immune reactivity (more 'alert') and after a challenge, a better catch-up growth. So also here effects were found on body weight and on the immune system. These seem to be valuable biomarkers.

A few studies with humans were performed. In the so called 'Kloosterstudie' (Karin Huber, 2006), seventeen nuns were one month on biodynamic food. There was found an improvement of physiological and of psychological parameters. However, this was not a 'blinded' study.

In the big European Parsifal study with 14.000 children in five countries (Alfven, 2005), children with an anthroposophic lifestyle, including organic and biodynamic food, had 30% less eczema and allergy complaints. These children had also a lower BMI (bodyweight). In the Koala study nearly 3000 mothers and children, of whom 25% with an 'alternative' lifestyle, are being studied e.g. on nutrition, lifestyle factors and allergy complaints. One result is that mothers who use organic dairy

have more CLA's in their mothers milk (Rist, 2007). Among the children at age 2 years it was found that children that use >90% organic dairy have 30 % less eczema complaints. (Kummeling, 2008).

The conclusion can be that the number of studies comparing nutrient contents is still increasing. Often differences between organic and conventional are found, but also differences within the (organic or conventional) group. This is a point of attention!

The number of studies on health effects increases also and a tendency seems to become visible. In animals and humans effects are being found on the immune system and on body weight development. In the laboratory effects on cell proliferation and on DNA-repair are found

Overall the body of evidence is growing.

2.1.2 Uptake of minerals and flavonoids from different production systems in humans

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Introduction: The organic farming has grown steadily during the last decades and the demand is still increasing. The main reason for people to choose organic food is sustainability and/or human health. However, the scientific evidence that organic food is healthier is still lacking. Different food production methods may result in differences in content of minerals and secondary metabolites. However, differences in content might not necessarily have any effect in humans if the absorption of the nutrients remains the same.

Purpose of the study: To evaluate if different food production methods results in different intakes and uptakes of minerals and secondary metabolites in humans.

Methods: Sixteen human volunteers were allocated to either organic or conventional diets for 22 days in a fully controlled randomized cross-over study. Blood, urine and faecal samples were collected at beginning and end of the study periods. Five selected flavonoids (urine), 5 selected minerals and 4 trace elements (faeces and urine) were analysed.

Results and conclusion: The organic diets had a significantly higher content of quercetin, 4.9 g/10 MJ in the organic diet vs 2.6 g/10 MJ in the conventional diet. The urinary excretion of both quercetin and kaempferol was significantly higher in the period where subjects were fed the organic diet (27 μ g/24h and 5 μ g/24h, respectively) compared to the period where they were fed the conventional diet (19 μ g/24h and 2 μ g/24h, respectively). The intake and retention of the mineral Mg and the trace element Mo were significantly higher from the organic diet (403 mg/d and 89 mg/d for Mg; 266 μ g/d and 85 μ g/d for Mo) than from the conventional diet (366 mg/d and 55 mg/d for Mg; 183 μ g/d and 57 μ g/d for Mo). Some varietal difference was seen in the study and it cannot be excluded that the observed effects originates from these differences.

2.1.3 Organic milk and nutritional benefits for the consumer

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Abstract: Milk is one of the most important nutritional sources especially in the nutrition of children but nowadays it has also become one of the major food allergens. Especially rawmilk due to bacterial reasons is no longer advised for the consumption through pregnant woman or very young and ill or old people. Remarkable that latest research shows a better health status of children from a farming and anthroposophical background in comparison to other children. In this context the beneficial properties of fresh farm milk and organic milk came into focus and were evaluated. In the framework of the PARSIFAL and KOALA studies it could be shown that organic milk consumption

reduces the risk of eczema in children and that early contact with stables and rawmilk induces protection against specific atopic disorders. Mothers consuming a large share of organic milk products in their diets had the highest CLA content in their breast milk. (Riedler et al., 2001 Rist et al., 2007 and Kummeling et al., 2008)

Parallel to these findings it is reported that the composition of organic milk and milk from low input systems compared to conventional milk from high input systems can be very different concerning the antioxidant and the fatty acid (FA) profile. Organic and low input milk have a higher content of conjugated linoleic acids (CLA), omega 3 FA's and a better omega-3 to omega-6 ratio (e.g. Butler et al, 2008). These compounds are supposed to have beneficial nutritional impacts for the consumer. Our own research results from a project comparing biodynamic and conventional milk quality (Kusche und Baars 2007) confirm these latest results and will be published later this year. Factors for a beneficial milk FA composition can be shortly put together as: outdoor grazing, high biodiversity (herbs) in pastures, low levels of concentrates, no silage feeding (except red clover) and higher altitudes.

It can be concluded that milk, in contrast of her conform appearance (white, liquid), can be very different in composition and quality. Specific health impacts of organic (farm)milk and reasons for that needs to be further investigated. The beneficial composition of organic milk and the potential seem to be optimal within a traditional and extensive dairy system. Animal welfare seems to go along with nutritional benefits for the consumer. In the process of expansions and conventionalisation of organic agriculture these questions concerning quality and health impact of organic food will gain special notice.

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2.1.4 The character of consumer concerns about healthy food

Katherine O'Doherty Jensen

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Abstract: Some results of two recent studies of consumer attitudes and shopping practices with reference to organic foods are presented.

It has earlier proved difficult to pinpoint the role played by health concerns in the food choices made by consumers. The reason is that a majority of many national populations tends to declare some concern with each of these issues.

The results of 6 focus groups conducted among Danish consumers (N=50) identified the following 5 factors as those which strongly differentiate consumers with respect to their choices between organic and conventional food products: (a) extent of involvement in food quality, (b) the need for convenient solutions to everyday problems of food provision, (c) the extent of satisfaction with the quality of organic food products, (d) the degree of trust placed in organic producers, production methods and labelling schemes, and (e) the extent to which consumer care exercised in everyday food provision takes the form of concern about long term effects on nature, ground water, plants,

animals and future generations. Latent Class Analysis applied to survey data obtained from a representative sample of Danish households (N=1,767) revealed that 6 consumer segments could be identified on the basis of these factors, ranging from those who were most positive towards organic foods ('The fully convinced') to those who were least positive ('The sceptical'). More involvement, satisfaction and trust were associated with more positive attitudes towards organic foods. The 3 consumer segments that are relatively positive together constitute approximately half of all households in the national population (52 %), accounting for 88 % of all organic sales on the national market. The distinguishing feature of those who are most positive (17 %) was concern about the long term effects of food production and consumption. This relatively small segment of consumers also accounts for almost half (46 %) of all organic sales.

The conception that organic foods are healthy is strongly associated with the absence of unwanted substances, especially with respect to the absence of synthetic pesticides, medicine residues and unwanted additives in processed foods. Secondary metabolites do not crop up in qualitative interviews with consumers. However, a strong interest in healthy eating habits does crop up and is among the distinguishing features of those who are most positive towards organic foods. It would seem that good news about the health benefits of organic foods would be greeted with great interest by many consumers, but especially by those who are already convinced about the health benefits – as well as other benefits – of these food products.

Links:

- Homepage of the CONCEPTS project: <http://www.concepts.elr.dk/uk>
- Homepage of ICROFS and link to English language version of White Paper on Development, Growth and Integrity of the Organic Sector in Denmark, Part I: http://www.icrofs.org/pdf/knowledge_synthesis.pdf
- O'Doherty Jensen K et al. (2008): 'Hvorfor Køber Forbrugere Økologi? [Why Consumers Buy Organic Foods]. In H.J. Alrøe & N. Halberg (eds.): Udvikling, vækst og integritet i den danske økologisektor [Development, growth and integrity of the organic sector in Denmark]. Foulum: ICROFS, Part II, Chapter 2, pp. 91-129. Available at: <http://ecowiki.org/OekologiskUdvikling/Hvidbog>
- Homepage of the QLIF (Quality Low Input Food) project: <http://www qlif.org>
- Lund T.B. & O'Doherty Jensen K: Consumption of Organic Foods from a Life History Perspective: An Exploratory Study among Danish Consumers. Available at: <http://orgprints.org/15200>
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2.2 Contaminants and micro organisms in Dutch organic food products: a comparison with conventional products. Food Additives & Contaminants 2008

Hoogenboom, L. A. P.¹; Bokhorst, J. G.²; Northolt, M. D.²; van de Vijver, L. P. L.²; Broex, N. J. G.¹; Mevius, D. J.³; Meijs, J. A. C.⁴; Van der Roest, J.¹

1: RIKILT Institute of Food Safety, Wageningen, the Netherlands 2: Louis Bolk Institute, Driebergen, the Netherlands 3: Central Veterinary Institute, Lelystad, the Netherlands 4: Biologica, Utrecht, the Netherlands

Abstract: Organic products were analysed for the presence of contaminants, microorganisms and antibiotic resistance and compared with those from conventional products. No differences were observed in the Fusarium toxins deoxynivalenol and zearalenone in organic and conventional wheat, during both a dry period and a very wet period which promoted the production of these toxins. Nitrate levels in head lettuce produced organically in the open field were much lower than those in conventional products. In iceberg lettuce and head lettuce from the greenhouse, no differences were detected. Organically produced carrots contained higher nitrate levels than conventional products. Both organic and conventional products contained no residues of non-polar pesticides above the legal limits, although some were detected in conventional lettuce. Organic prod-

ucts contained no elevated levels of heavy metals. Salmonella was detected in 30% of pig faeces samples obtained from 30 organic farms, similar to the incidence at conventional farms. At farms that switched to organic production more than 6 years ago no Salmonella was detected, with the exception of one stable with young pigs recently purchased from another farm. No Salmonella was detected in faeces at the nine farms with organic broilers, and at one out of ten farms with laying hens. This is comparable with conventional farms where the incidence for Salmonella lies around 10%. Campylobacter was detected in faeces at all organic broiler farms, being much higher than at conventional farms. One of the most remarkable results was the fact that faeces from organic pigs and broilers showed a much lower incidence of antibiotic resistant bacteria, except for Campylobacter in broilers. It is concluded that the organic products investigated scored as equally well as conventional products with regard to food safety and at the same time show some promising features with respect to antibiotic resistance.

The full article is published in: [Food Additives and Contaminants](#), Volume 25, Number 10, October 2008, pp. 1197-1209(13)

2.3 Effect of Different Organic Farming Methods on the Phenolic Composition of Sea Buckthorn Berries

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Abstract: The effects of different organic cultivation methods on the berry phenolics of two Finnish sea buckthorn (*Hippophae rhamnoides* L. ssp. *rhamnoides*) cultivars, 'Terhi' and 'Tytti', were studied in an experimental field at a coastal area in Merikarvia, western Finland. Cultivation methods included different fertilizers (designed for organic cultivation), mulches (organic and plastic), and land contours (flat land versus ridged beds). Two experiments were conducted: The first, a fertilization experiment, allowed for the estimation of the effects of cultivar, fertilizer, land contour, and all of their interactions. The second experiment, a mulch experiment, allowed for the estimation of the effects of mulch, land contours, and their interactions for the cultivar 'Tytti'. Berry phenolics were analyzed by high-performance liquid chromatography (HPLC) with ultraviolet (UV) detection. The results suggest that there are significant differences between the cultivars and cultivation methods. The concentrations of quercetin derivatives 1–3, isorhamnetin 3,7-diglucoside, quercetin-3-glucoside-7-rhamnoside, quercetin 3-glucoside, isorhamnetin 3-glucoside, and flavonoid derivative 3 were higher in 'Tytti' than in 'Terhi', while concentrations of isorhamnetin-glucoside 2 and 3 were higher in 'Terhi' than in 'Tytti'. Flat land increased the concentrations of isorhamnetin 3,7-diglucoside, isorhamnetin-glucoside 1, quercetin derivatives 2 and 4, and condensed tannins. Mulch did not have any significant effect on the concentrations of phenolic compounds. These results indicate that the phenolic accumulation in berries of studied sea buckthorn cultivars seems to be mainly dependent upon cultivar selection and soil structure.

The full article is published in the [Journal of Agricultural and Food Chemistry](#), 2009, 57 (5), pp 1940–1947. DOI: 10.1021/jf802797v

2.4 Fruit Quality and Bioactive Compounds with Antioxidant Activity of Tomatoes Grown On-Farm: Comparison of Organic and Conventional Management Systems

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Abstract: Replicated field trials at three matched farm pairs in southern and central Taiwan were established in October 2004 and 2005 to compare fruit quality and nutritional parameters of tomatoes grown on-farm under organic versus conventional management systems in tropical and subtropical environments. Two processing tomato varieties were evaluated using a randomized complete block design at each of the farms. Aggregation of farms by type (organic vs conventional) across two years resulted in no significant differences between organic and conventional farming systems for all tomato fruit parameters measured, including quality (pH, soluble solids, acidity, and color), content of bioactive compounds with antioxidant activity (β -carotene, lycopene, ascorbic acid, and total phenolics), and antioxidant activity. This study indicated no consistent effect of the farming system on tomato fruit parameters. Farm management skills combined with site-specific effects contributed to high lycopene levels, and the choice of variety significantly influenced the content of bioactive compounds, particularly ascorbic acid and total phenolics.

The full article is published in: [Journal of Agricultural and Food Chemistry](#), 2009, 57 (4), pp 1188–1194. DOI: 10.1021/jf801992s

2.5 Search for Diagnostic Proteins To Prove Authenticity of Organic Wheat Grains (*Triticum aestivum* L.)

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Abstract: Research comparing the biochemical composition of wheat grains from organic or conventional agriculture has used the targeted analytical approach. To obtain a more comprehensive record of the food's composition, we employed protein profiling techniques. Levels of 1049 proteins were recorded in wheat grains (*Triticum aestivum* L., cv. Titlis) of two growing seasons from a rigorously controlled field trial in Switzerland, containing organic and conventional plots. Levels of 25 proteins were different between organic and conventional wheat in both years. Storage proteins, enzymes of carbohydrate metabolism, a peroxidase, and proteins of unknown function were affected by the agricultural regime. Total protein content was lower in organic wheat. We consider these differences negligible with regard to nutrition in an average diet and propose that food quality of conventional and organic wheat grown in the field trial was equal. Applying various filters and calculations, one of which takes seasonal influences into account, 16 of the 25 proteins with different levels in organic and conventional wheat were retained. These 16 “diagnostic” proteins have the potential to afford a signature to prove authenticity of organic wheat.

The full article is published in: [Journal of Agricultural and Food Chemistry](#), 2009, Article ASAP, DOI: 10.1021/jf802923r

2.6 Authentication of Organic Milk Using $\delta^{13}\text{C}$ and the α -Linolenic Acid Content of Milk Fat

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Abstract: The carbon stable isotope ratio ($\delta^{13}\text{C}$) and the α -linolenic acid (C18:3 ω 3) content of milk fat were analyzed to examine their applicability as general markers for the authentication of organic retail milk in Germany. To record the variable effect of feeding, including the seasonal influence on milk composition, three conventionally and three organically produced brands of retail milk were collected biweekly during a period of 18 months. Altogether 286 milk samples were analyzed. Threshold values for the identification of German organic milk were established and allowed to delimit almost all conventional samples. Organic retail milk was always above a minimum C18:3 ω 3 content of 0.50% and below a maximum $\delta^{13}\text{C}$ of -26.5‰ . The universal and strongly negative correlation ($r = -0.93$) between C18:3 ω 3 and $\delta^{13}\text{C}$ impedes the intentional manipulation of conventional milk. Conventional milk can naturally exceed the C18:3 ω 3 limit under atypical and rare conditions, but differentiation from organic milk can be improved by time-resolved comparison of data. In contrast with the general opinion, organic milk did not generally contain more c9,t11-C18:2 (CLA) than conventional milk. The proposed limits may deviate with dairy products containing milk from foreign countries.

The full article is published in: [Journal of Agricultural and Food Chemistry](#), 2009, 57 (3), pp 785–790. DOI: 10.1021/jf8022029

2.7 Fatty acid and fat-soluble antioxidant concentrations in milk from high- and low-input conventional and organic systems: seasonal variation

Butler, Gillian; Nielsen, Jacob H; Slots, Tina; Seal, Chris; Eyre, Mick D; Sanderson, Roy; Leifert, Carlo

Abstract:

BACKGROUND: Previous studies showed differences in fatty acid (FA) and antioxidant profiles between organic and conventional milk. However, they did not (a) investigate seasonal differences, (b) include non-organic, low-input systems or (c) compare individual carotenoids, stereoisomers of α -tocopherol or isomers of conjugated linoleic acid. This survey-based study compares milk from three production systems: (i) high-input, conventional (10 farms); (ii) low-input, organic (10 farms); and (iii) low-input non-organic (5 farms). Samples were taken during the outdoor grazing (78 samples) and indoor periods (31 samples).

RESULTS: During the outdoor grazing period, on average, milk from the low-input systems had lower saturated FAs, but higher mono- and polyunsaturated FA concentrations compared with milk from the high-input system. Milk from both the low-input organic and non-organic systems had significantly higher concentrations of nutritionally desirable FAs and antioxidants—conjugated linoleic (60% and 99%, respectively) and α -linolenic (39% and 31%, respectively) acids, α -tocopherol (33% and 50%, respectively) and carotenoids (33% and 80%, respectively)—compared with milk from the high-input system. Milk composition differed significantly between the two low-input systems during the second half of the grazing period only; with milk from non-organic cows being higher in antioxidants, and conjugated linoleic acid, and that from organic cows in α -linolenic acid. In contrast, few significant differences in composition were detected between high-input and low-input organic systems when cows were housed.

CONCLUSIONS: Milk composition is affected by production systems by mechanisms likely to be linked to the stage and length of the grazing period, and diet composition, which will influence subsequent processing, and sensory and potential nutritional qualities of the milk. Copyright © 2008 Society of Chemical Industry

The full article is published in: [Journal of the Science of Food and Agriculture](#), Volume 88, Number 8, June 2008, pp. 1431-1441(11)

2.8 Fruit Quality, Antioxidant Capacity, and Flavonoid Content of Organically and Conventionally Grown Blueberries

Shiow Y. Wang, Chi-Tsun Chen, William Sciarappa, Chien Y. Wang and Mary J. Camp

Abstract: The effect of cultivation practices on fruit quality and antioxidant capacity in highbush blueberries var. Bluecrop (*Vaccinium corymbosum* L.) was evaluated from random samples of commercial late harvest fields in New Jersey. Results from this study showed that blueberry fruit grown from organic culture yielded significantly higher sugars (fructose and glucose), malic acid, total phenolics, total anthocyanins, and antioxidant activity (ORAC) than fruit from the conventional culture. In organically cultured fruit, the average values for the ORAC, total anthocyanins, and total phenolic content were 46.14 μmol of Trolox (TE)/g of fresh weight (fwt), 131.2 mg/100 g of fwt, and 319.3 mg/100 g of fwt, respectively. In conventionally cultured fruit, the average values for the ORAC, total anthocyanin, and total phenol content were 30.8 μmol of TE/g of fwt, 82.4 mg/100 g of fwt, and 190.3 mg/100 g of fwt, respectively. The organic culture also produced fruit with higher contents of myricetin 3-arabinoxide, quercetin 3-glucoside, delphinidin 3-galactoside, delphinidin 3-glucoside, delphinidin 3-arabinoxide, petunidin 3-galactoside, petunidin 3-glucoside, and malvidin 3-arabinoxide than conventional culture. There was a significant correlation between the ORAC values and total phenolics and total anthocyanins. These results indicate that even though there were variations in phytonutrient content among individual farms within each cultural system, significant differences between two cultivation practices were evident.

The full article is published in: the [Journal of Agricultural and Food Chemistry](#), 2008, 56 (14), pp 5788–5794.

2.9 Comparison of physicochemical, microscopic and sensory characteristics of ecologically and conventionally grown crops of two cultivars of tomato (*Lycopersicon esculentum* Mill.)

Ordóñez-Santos, Luis Eduardo; Arbones-Maciñeira, Enrique; Fernández-Perejón, José; Lombardero-Fernández, Matilde; Vázquez-Odériz, Lourdes; Romero-Rodríguez, Angeles

Abstract:

BACKGROUND: Numerous studies have compared ecologically produced foods with conventionally produced competitors, with contradictory results. In this work we investigated the physicochemical, microscopic and sensory properties of two tomato cultivars (Lladó and Antillas), which were grown both ecologically and conventionally.

RESULTS: The physicochemical variables size, weight, firmness, total acidity, pH, total solids content, lycopene content and CIELab a^* , b^* , a^*/b^* , C^* and h^* were all significantly influenced by cultivar, as were the sensory variables external colour, internal colour, external aroma intensity and flavour persistence. Compared with conventionally grown tomatoes, ecologically grown tomatoes had larger total solids contents and larger values of the CIELab colour parameters b^* , C^* and h^* ,

but smaller sizes and weights and smaller values of the CIELab parameter ratio a^*/b^* ; however, these physicochemical differences were insufficient for growing method to have a significant influence on any of the sensory attributes that were evaluated. Microscopy showed the influence of cultivar on lycopene content, but no other structural differences were observed between the two cultivars or between tomatoes grown by different methods.

CONCLUSIONS: The statistically significant differences found in this study were mainly between cultivars rather than between tomatoes grown using different management practices. Copyright © 2009 Society of Chemical Industry

The full article is published in: [Journal of the Science of Food and Agriculture](#), Volume 89, Number 5, 30 March 2009, pp. 743-749(7). DOI: 10.1002/jsfa.3505

2.10 Effects of organic and conventional production systems on quality and nutritional parameters of processing tomatoes

Pieper, Joy Rickman; Barrett, Diane M

Abstract:

BACKGROUND: The impact of organic and conventional production systems on quality and nutritional parameters of fruits and vegetables is still under discussion. The objective of this study is to determine whether the production system has a significant effect on the quality and nutritional content of one variety of processing tomatoes grown on a commercial scale by comparing three different growers for two production years.

RESULTS: Conventional tomatoes appeared to be more mature at time of harvest as determined by visual inspection of color. Total and soluble solids were significantly higher and consistency was greater in organic tomatoes. Differences in nutrient content were not statistically significant between production systems. Glutamate, glutamine, and tyrosine levels were significantly higher in conventional tomatoes, as were total nitrogen and ammonium concentrations.

CONCLUSION: Results from this study show that nutritional and quality parameters vary greatly by grower, production system, and year for the same tomato cultivar. Significantly higher average soluble solids content and consistency in organic tomatoes are especially important to the processing tomato industry. The apparent slower development of organic tomatoes may be responsible for many of the significant findings in this study and may explain some of the conflicting reports in previous literature. Copyright © 2008 Society of Chemical Industry

The full article is published in: [Journal of the Science of Food and Agriculture](#), Volume 89, Number 2, 30 January 2009, pp. 177-194(18). DOI: 10.1002/jsfa.3437

2.11 Influence of the Farming System on the Xanthophyll Content of Soft and Hard Wheat

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Abstract: The organic market is growing rapidly. This is because customers expect organic food to be authentic and healthy. For plant products the awareness of pesticide residues is one main point in customers' decisions for organic food, but in terms of secondary plant compounds, antioxidants are also expected benefits of organically produced foods. For wheat the xanthophylls are one group of those secondary plant compounds. There are no recent studies about the influence of cultivation practices on the xanthophyll content. This study examined the influence of the farming system on the content of lutein and zeaxanthin. To evaluate this, samples of a long-term field trial

were examined by comparing conventional (nonorganic) and organic produce grown under controlled conditions. Additionally, samples were examined from farm pairs located in Germany. Each of the pairs consisted of one organically and one conventionally producing farm, located in local neighbourhood and cultivating the same wheat variety. To summarize, the influence of the farming system is very small. The differences are mainly caused by different kernel sizes (thousand-kernel weight), which are found to be correlated to the lutein content.

The full article is published in: [Journal of Agricultural and Food Chemistry](#), 2009, 57 (1), pp 182–188. DOI: 10.1021/jf801407v

2.12 Consumption of organic foods and risk of atopic disease during the first 2 years of life in the Netherlands.

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Abstract: We prospectively investigated whether organic food consumption by infants was associated with developing atopic manifestations in the first 2 years of life. The KOALA Birth Cohort Study in the Netherlands (n 2764) measured organic food consumption, eczema and wheeze in infants until age 2 years using repeated questionnaires. Diet was defined as conventional (90 % organic). Venous blood samples taken from 815 infants at 2 years of age were analysed for total and specific IgE. Multivariate logistic regression models were fitted to control for potential confounding factors. Eczema was present in 32 % of infants, recurrent wheeze in 11 % and prolonged wheezing in 5 %. At 2 years of age, 27 % of children were sensitised against at least one allergen. Of all the children, 10 % had consumed a moderately organic diet and 6 % a strictly organic diet. Consumption of organic dairy products was associated with lower eczema risk (OR 0.64 (95 % CI 0.44, 0.93)), but there was no association of organic meat, fruit, vegetables or eggs, or the proportion of organic products within the total diet with the development of eczema, wheeze or atopic sensitisation. Further studies to substantiate these results are warranted.

The full article is published in: [British Journal of Nutrition](#), 2008; 99-598-605.

2.13 The Impacts of Yield on Nutritional Quality: Lessons from Organic Farming

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Abstract: A majority of well-designed studies comparing nutrient density (milligrams of a given nutrient per kilogram of food) in organically and conventionally produced fruits and vegetables show modest to moderately higher concentrations of most nutrients in organic produce. Likewise, organic produce is either as flavorful as or more flavorful than conventional produce and often tends to store better. Physiological factors that may account for these differences include the levels and form of nitrogen applied to crops, the balance of macro- and micronutrients in the soil, soil quality, average cell size, glycosylation status, and concentrations of plant secondary metabolites.

The full article is published in: [HortScience](#) Feb 1 2009: 12–14.

2.14 Declining Fruit and Vegetable Nutrient Composition: What Is the Evidence?

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Abstract: Three kinds of evidence point toward declines of some nutrients in fruits and vegetables available in the United States and the United Kingdom: 1) early studies of fertilization found inverse relationships between crop yield and mineral concentrations—the widely cited "dilution effect"; 2) three recent studies of historical food composition data found apparent median declines of 5% to 40% or more in some minerals in groups of vegetables and perhaps fruits; one study also evaluated vitamins and protein with similar results; and 3) recent side-by-side plantings of low- and high-yield cultivars of broccoli and grains found consistently negative correlations between yield and concentrations of minerals and protein, a newly recognized genetic dilution effect. Studies of historical food composition data are inherently limited, but the other methods can focus on single crops of any kind, can include any nutrient of interest, and can be carefully controlled. They can also test proposed methods to minimize or overcome the diluting effects of yield whether by environmental means or by plant breeding.

The full article is published in: [HortScience](#) Feb 1 2009: 15–19.

2.15 Organically produced foods: nutritive content: citations January 2000-July 2008

Gold, Mary V.

This bibliography contains 283 citations for articles, conference papers, reports and book chapters published 2000 through July 2008. Cited works focus specifically on the nutrient content of organically produced foods: vitamin and mineral content, phytonutrients (phytochemicals), fatty acids and related chemical constituents. Each cited item relates directly to food produced from organic agricultural and/or handling practices.

The bibliography is published by the [Alternative Farming Systems Information Centre](#), 2008. [\[Full text\]](#)

3 Related Newsletters

Below we offer you some information from other Newsletters that are related to FQH:

3.1 The Scoop, Newsletter of The Organic Centre:

3.1.1 A Roadmap to the Fountain of Youth?

[\(The Scoop, December 2008\)](#)



USDA scientists report in the *Journal of Agricultural and Food Chemistry* that a Pterostilbene in berries and grapes can reverse the negative effects of aging on the human brain, while also improving working memory.

The compound apparently produces these beneficial effects through action as an antioxidant in the hippocampus region of the brain.

In work sponsored by The Organic Center at Washington State

University, we found that organic berries contained higher levels of pterostilbenes, compared to conventional fruits. Watch for more details on this work in the January, 2009 in The Scoop.

Source: James Joseph et al., *Journal of Agricultural and Food Chemistry*, 2008

3.2 ICROFS:

3.2.1 Organic consumer demand for health reasons

[\(ICROFS Fact sheet no.1\)](#)

Consumer research has identified trends in the food area showing that organic consumers move away from “good food being just tasty” to “good taste must also be healthy food.” In other words, consumers attribute positive qualities to organic foods, such as healthy, tasty, authentic, local, natural and fresh, free from pesticides, safe and certified. The question is to what extent there is solid scientific evidence to support such consumer perceptions?

4 Agenda

4.1 Scientific Workshop for FQH members, 5 and 6 May 2009

On 5 and 6 May 2009 FQH will again organize a Scientific Workshop for Members, with the theme “Concept mapping on terms relevant for organic food quality and health”. Also the Strategic Research Agenda of TP Organics will be discussed.

For more information please contact the FH-coordinator at fqh@louisbolk.nl.

4.2 2009 EFFoST Annual Conference

New Challenges in Food Preservation: Processing – Safety – Sustainability, 11-13 November 2009 | Budapest, Hungary

Organised in association with IUFOST, METI, KEKE, FISEC and EHEDG, the 2009 EFFoST (European Federation of Food Science and Technology) Annual Meeting looks at food preservation, focusing on issues of processing, safety and sustainability. CALL FOR POSTERS DEADLINE: 30 June 2009

More information at: www.fffostconference.com

Imprint

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