

FOCUS ON ORGANIC FOOD QUALITY - PHYTONUTRIENTS



There are several thousand naturally occurring compounds in plant foods other than vitamins and minerals. Known as phytonutrients, secondary metabolites, natural pesticides or plant toxins, evidence is emerging that higher concentrations of these compounds occur in organic crops. But is this good or bad news? BFA nutritionist Shane Heaton tells all...

The question of whether phytonutrients are generally toxic or beneficial has been the subject of much debate, stemming from the fact that many are produced by plants as defense against pests and diseases (hence labels like 'plant toxins' or 'natural pesticides'), and many are lethal or carcinogenic in high-dose toxicity tests on rats.

It has been argued that exposure to these naturally occurring 'toxins' in our diet is a far greater risk to our health than potential exposure to synthetic toxins such as pesticide residues (Ames 1990). However epidemiological evidence doesn't support this view. It's well established that the greater the daily intake of vegetables and fruit, the lower the risk of leading causes of death such as cancer, cardiovascular disease and diabetes.

Clearly the toxicity of phytonutrients (as with all substances) is dose related. Those that are toxic at high concentrations may be innocuous or even benefi-

cial at lower (naturally occurring) concentrations. This same argument could also be true for synthetic compounds, though there is no evidence to support this in the case of pesticide residues (in fact evidence to the contrary is slowly emerging).

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The benefits of so-called 'natural toxins' are being increasingly documented. Many are powerful antioxidants – compounds capable of preventing unstable molecules (known as free-radicals) from causing damaging chain reactions that disrupt normal reactions in the body, burden the immune system, speed ageing processes and potentially initiate heart disease and cancer.

Phytonutrients are emerging as the most likely reason fruits and vegetables are so health promoting.

WHY WOULD ORGANIC CROPS CONTAIN MORE PHYTONUTRIENTS?

There are three main hypotheses on why organic crops will tend to have higher concentrations of phytonutrients than conventional crops:

Different plant protection methods

Many phytonutrients are produced by plants to protect themselves against attack, disease and damage, and if a plant is subjected to higher levels of stress or attack it will produce more (Anderson 2000). So if insecticides and fungicides are reduced or avoided, a greater reliance on the plants' own natural protection systems will result in higher phytonutrient levels.

Different fertilisation methods and growth rates

Researchers have shown that higher nitrogen availability generally reduces the quantity and diversity of phytonutrients in crops and wild plants alike (Anderson 2000). Plants face a choice to grow or defend (Herms & Mattson 1992). The lower nitrogen supply in organic farming leads to an earlier completion of growth and commencement of ripening and other maturity processes, resulting in higher phytonutrients involved in colour, taste and defense.

Varietal differences

Because of restrictions on pesticide and fungicide usage, organic farmers are more likely to select varieties with greater resistance to pests or disease, and could thus be choosing varieties that naturally produce higher levels of phytonutrients.



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COMPARATIVE STUDIES organic vs. conventional

Evidence is growing that supports and confirms the expectation that organic crops will contain higher phytonutrient levels. Researchers have confirmed more lycopene in organic tomatoes (Pither & Hall 1990), more polyphenols in organic potatoes (Hamouz *et al.* 1999), more flavonols in organic apples (Weibel 2000), and more resveratrol in organic red wine (Levite *et al.* 2000). The very latest research continues to yield positive results for organic crops: Italian researchers have found higher polyphenols in organic peaches and pears (Carbonaro *et al.* 2002). A team from the University of California (Asami *et al.* 2003) also found higher levels of polyphenols in organic blackberries, strawberries and corn, while a French study has found higher lycopene, beta-carotene and polyphenols in organic tomatoes (Borel *et al.*, in press).

A recent Danish literature review estimated, from the limited amount of evidence so far, that organically grown vegetables will tend to have 10–50 per cent more phytonutrients than conventionally cultivated vegetables, and concluded “if phytonutrients are an important determinant of the nutritional value of fruits and vegetables in the diet of developed countries, then vegetable and fruit products grown in organic agriculture would be expected to be more

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THE BEST PHYTONUTRIENT FOODS

Phytonutrients are present in all foods, though the following foods are your best sources and should be regular features in a healthy diet, with organic versions best of all:

Berries including blueberries, blackberries, strawberries and raspberries are rich in flavonoids called anthocyanins, and have the highest antioxidant activity of any plant foods.

Cabbage, broccoli, cauliflower and Brussels sprouts are rich in glucosinolates – they can slow thyroid function but are also one of the best proven cancer preventing components in vegetables.

Dark green, red, and orange vegetables are rich in flavonoids and carotenoids – powerful antioxidants that are also anti-inflammatory, anti-allergenic, collagen stabilising, artery protective, and can discourage the growth of established tumors.

Tomatoes and watermelons are rich in the carotenoid lycopene – an antioxidant beneficial in the prevention and treatment of breast and prostate cancers.

Green tea and red wine are rich in polyphenols – potent antioxidants with cancer-protective and anti-ageing effects.

Garlic and onion contain sulphur-based phytonutrients such as allicin in garlic – powerful antioxidants known to aid detoxification, heavy metal removal, general connective tissue repair and cardiovascular protection. Regular consumption of garlic and onion can significantly reduce the risk of heart disease and cancer.

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THE BOTTOM LINE

Higher levels of phytonutrients represent a powerful argument for the health benefits of organic food. Research will continue to extol the benefits of phytonutrients to human health and the relatively higher levels in organically grown crops. With both consumers and regulators demanding more evidence of the health benefits of organic food, this is an important issue for the organic industry to further research and communicate. Yet with biotechnology and other methods being developed to boost specific phytonutrient levels, the key message for consumers remains the total range of benefits delivered by organic food and farming.

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