

Organics & Nutrition the Reality Explained

Reader Question and Answer Column

READER QUESTION:

I find it hard to believe that conventional soils are deficient of minerals. If there's a deficiency in a mineral needed for growth of the plant, it simply does not yield commercially viable amounts of fruits or vegetables. Most commercial fertilisers are formulated to give the highest yield of whatever crop they are used on. Depleted soil is not commercially profitable. Therefore, farmers use fertilisers containing all the needed nutrients for specific crops. If it's true, as you suggest, that organic crops contain more minerals, can you explain why?

Dennis, Toowoomba



ANSWER:

This edition's reader questions will be answered by Nutritionist and regular *Organic Journal* contributor, SHANE HEATON

It's true that conventional farmers supply all the nutrients needed for the CROP, usually nitrogen, phosphorus, potassium (N P K), calcium (Ca), magnesium (Mg) and sulphur (S), but NOT all the nutrients needed for HUMANS. This is the key problem, and the assertion that all the nutrients needed for the crop are supplied completely misses the point. Low levels of trace minerals like zinc (Zn), selenium (Se), manganese (Mn), copper (Cu), molybdenum (Mo) are common in crops, and indeed in the people who eat them.

In 2001 I conducted a snap analysis of two potato samples - of the same variety, same origin, same time since harvest, same size, same appearance. The only difference was the method of agriculture used to produce them - organic vs conventional. The laboratory results showed that the mineral contents were similar for the 'macro' minerals added to the conventional crop as fertiliser, but when it came to the trace minerals - those overlooked by conventional farming but never-the-less very important for human health - they were far higher in the organic potatoes, sometimes hundreds of times higher. This was only a pilot study of four potatoes, so nothing to get too excited about at this stage, but it does demonstrate the point I make above, that the conventional potato may have all the nutrients it needs, but may not supply you with all the nutrients you need.

This has also been supported by a recent long-term field trial in Canada which found that although equal yields of corn, potatoes, car-

rots and cabbage were removed from the plots each year, soil tests after six years indicated that the non-organically fertilised soils were generally equal or higher in P and K, but lower than compost enriched soils in organic matter, Ca, Mg, Mn, Cu and Zn.

Though it's not just soil depletion that can bring about differences in nutrient content of organic and conventional crops. Possible reasons for higher nutrient contents in organically grown crops include:

HIGHER DRY MATTER CONTENTS

Nitrogenous fertilisation creates rapid lush growth, and thus conventional plants and crops have a higher water content. The non-water component of crops, known as 'dry matter', contains the nutrients and is higher in organic crops by around 20 per cent. There's more 'food' in organic food, so you get more carrot in an organic carrot, for example. This is sometimes suggested to be the only reason for differences, though the nutrient content differences are usually greater than just the dry-matter content differences, and there are several other reasons why:

SOIL BIOLOGICAL ACTIVITY

Organic standards are designed to protect and encourage soil micro-organisms, which are

necessary to 'unlock' nutrients from the soil, form symbiotic relationships with plants and make nutrients available to them. Artificial fertilisers, herbicides and pesticides suppress these micro-organisms, thus diminishing the 'life' of the soil and hindering the many complex and often poorly understood biological processes needed for nutrient supply to the plants. The conversion period of three years required before a farm is awarded full organic status is partly to allow this soil microbiological life to recover and multiply.

VARIETY

The varieties of plants grown by non-organic farmers are likely to be selected to maximise yields or factors such as ease of harvesting, rather than on the basis of nutritional quality or resistance to pests or disease (which may influence secondary nutrient contents). Therefore, differences in choice of culti-

var between the two systems might result in differences in nutritional quality.

INDUCED DEFICIENCIES

Interactions between large amounts of the major fertiliser elements and other major, minor or trace elements in the soil can interfere with availability of some elements essential to crop growth or the human diet. ▶

Possible reasons for higher nutrient contents in organically grown crops include:

High Dry Matter
Soil Biological Activity
Variety
Induced Deficiencies
Pest Control
Level of Fertilisation

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PEST CONTROL

Pesticides may directly or indirectly affect certain functions of the plant involved in the synthesis or uptake of certain nutrients, as shown in some field experiments.

LEVEL OF FERTILISATION

It's been shown that vitamin C levels decrease with higher rates of fertilisation regardless of whether it is synthetic or organic. While excessive nitrogen fertilisation is possible in organic farming, because manures and composts must be mineralised by the biological life in the soil before the nitrogen is widely available to the crop, this is much less likely

than in non-organic farming where readily soluble nitrogen is typically applied in much higher doses.

YIELD DIFFERENCES

On average, organically grown crops give lower yields than non-organically grown ones, meaning the same area produces less biomass, and it has been suggested that this may account for some of the differences in nutrient availability to crops. ■

For further information

References and nutrition articles are listed on the website www.bfa.com.au



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READER QUESTION:

Hi Shane. I've just read your article about phytonutrients in the Organic Journal. I've been doing a little bit of my own research and have come across a theory that phytonutrients breakdown quickly once the plant has been harvested. For something like a berry, the majority of the phytonutrients may have broken down within 24 to 48 hours of being harvested. So both conventional and organic food may have higher levels of phytonutrients if they are consumed quickly after harvest. Do you know if any research has been done on this?

Dan Hamilton



ANSWER:

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I don't think it's true that the majority of the phytonutrients may have broken down within 24 to 48 hours of being harvested in most crops. Take prunes for example, as a dried plum, they have one of the highest antioxidant capacities of any food due to their high phytonutrient content. They're certainly a long way away from harvest.

I do agree that eating fresh food is just as important as eating organic food. Some nutrients do begin declining after harvest, such as vitamin C. The phytonutrients may begin declining also - I've not seen any evidence of this - but I doubt they'd be substantially diminished. Fresh food provides more than nutrients - there are researchers, in Europe especially, looking at questions of vitality and the effect that the vitality levels in food can have on the health of those consuming it.

An interesting study in Italy by Serafini *et al* (2002) shows the effect of acute ingestion of fresh and stored lettuce on plasma total antioxidant capacity and antioxidant levels in human subjects. *Br J Nutr* 88(6) p615-23, showed that lettuce consumed on the day of harvest raised plasma antioxidant capacity by 50%, while the same lettuce consumed by the same people 3 days after harvest showed no change in plasma antioxidant capacity. This lettuce was cut, washed and bagged, and we could expect the cutting to have begun oxidation processes, perhaps explaining the findings.

Other studies have compared the antioxidants in wine stored for months, and the levels are still high. The key issue with phytonutrients is that they are antioxidants, so oxidation processes will diminish their content in foods.

Oxidation is increased by heat, light and air. Juicing at home is a good example of this - you want to drink it soon after juicing to reduce the level of oxidation, usually seen as discolouration - like what a cut apple or avocado will do.

CERTAINLY eat fresh food, the freshest you can get, and a variety of antioxidant rich foods - the more colourful the better - berries are great - I eat frozen for much of the year, but don't worry about lost nutrients in foods more than a day old, which in reality is what most of us have access to.

Good health to you, Shane

PS - if you have any research that shows phytonutrient levels declining rapidly after harvest I'd be very interested to see it.